

# MGE™ Galaxy™ 6000

50, 60 Hz

250 - 600 kVA

## Installation manual

Single-unit UPS

Modular UPS

Parallel UPS with SSC

Frequency converters

Static Switch Cubicle



# APC®

by Schneider Electric



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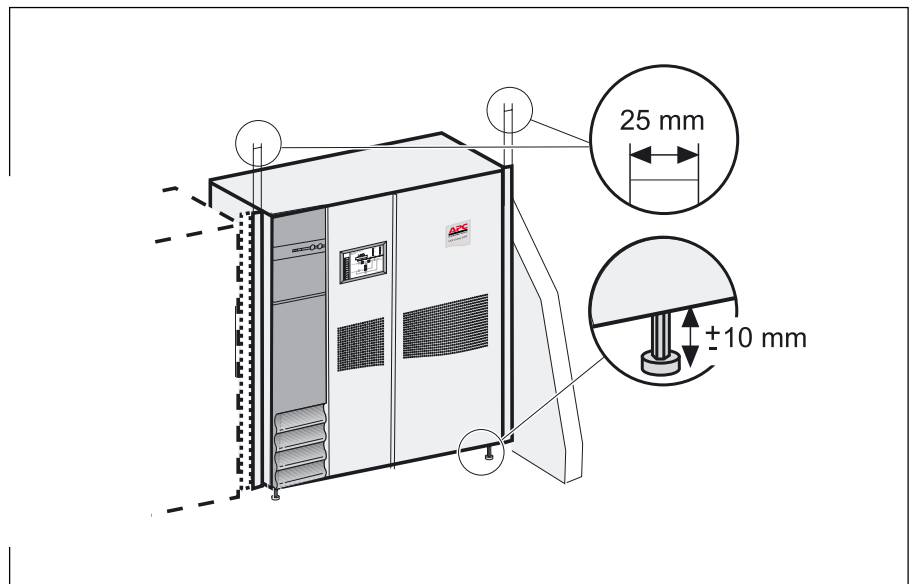
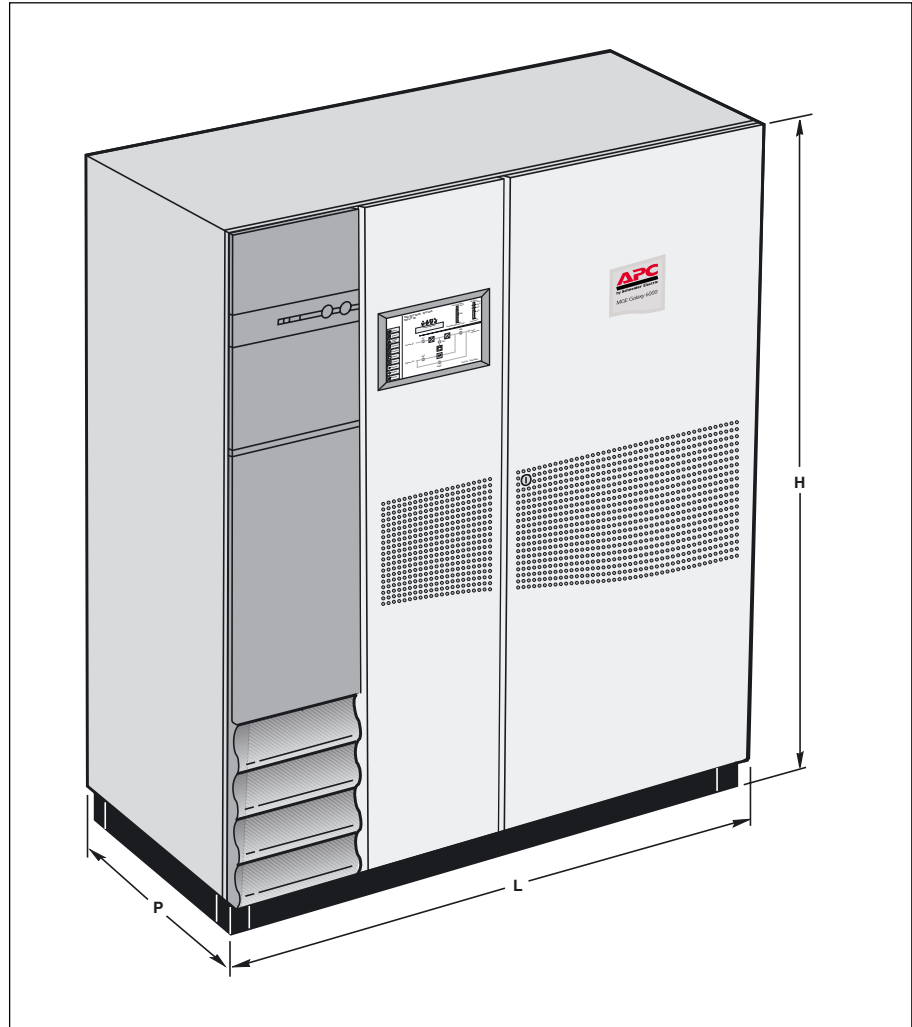
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# Characteristics

## Characteristics common to all cubicles

- After moving them to their installation location on their pallets, **MGE™ Galaxy™ 6000** cubicles can be moved short distances using a forklift or pallet-mover when the front, rear and side base panels are not mounted. The forks can be inserted from all four sides into 100 mm  $\pm$  10 mm high openings;
- the unadjusted cubicle height (H) is 1900/2000 mm; after lifting the cubicle, the height can be adjusted  $\pm$  10 mm by screwing in or out the four feet;
- the bearing surface corresponds to the area of the four cylindrical foot pads (60 mm diameter) positioned in each corner of the cubicle;
- the cubicle depth (D) is 840 mm (800 mm without doors and panels);
- operating temperature range for rectifier-inverter, frequency converter or Static Switch Cubicles: 0°C to 35°C at rated output (40°C for a maximum of 8 hours) and 30°C maximum for overload conditions. Operation outside the specified temperature range will reduce service life;
- relative humidity: 95% maximum;
- maximum operating altitude without derating: 1000 m;
- connection via the bottom for rectifier-inverter cubicles, or via the top with the addition of an optional duct that can be installed on the right side of the cubicle. The auxiliary and Static Switch Cubicles are designed for connections via the top or bottom.
- the connection cables may be run in three ways:
  - ◊ in a trench running under the cubicles,
  - ◊ under a false floor,
  - ◊ on the floor under the cubicles, in the free space equal to the height of the feet; in this case the cables should be run side by side to avoid blocking the flow of air for ventilation.
- the intercubicle connection cables are not supplied (except for the wires for auxiliary interconnections);
- normally the cubicles do not have to be secured to the floor; the footpads nevertheless have holes with an average depth of 12 mm designed for the fitting of M16 anchor bolts;
- the cubicle doors are secured by Ronis locks (key 405).

**MGE™ Galaxy™ 6000 UPS: example of a rectifier-inverter cubicle**



## Rectifier-inverter cubicles

The parameters given in the table opposite can be used to determine the required rating of a single-unit or modular UPS, a frequency converter, or a parallel UPS with SSC.

**Characteristics of rectifier-inverter cubicles**

rated inverter output in kVA	cubicle width W in mm (1)	cubicle height H in mm	cubicle depth D in mm	maximum weight in kg
250	1600	1900 ± 10	840	1650
300	1600	1900 ± 10	840	1650
400	1600	1900 ± 10	840	2030
450	1600	2000 ± 10	840	2070
500	1600	2000 ± 10	840	2205
600	3600	1900 ± 10	840	3500

(1) 25 mm must be added on each side to the indicated cubicle width, i.e. 50 mm in all per cubicle. This applies to all cubicle installation cases.

When installing several cubicles, allow for a tolerance of 0/+3mm per metre.

## Static Switch cubicles

**Characteristics of Static Switch Cubicles**

rated SSC output in kVA	cubicle width W in mm (1)	cubicle height H in mm	cubicle depth D in mm	maximum weight in kg
500	1000	1900 ± 10	840	350
800	1000	1900 ± 10	840	500
1200	1600	1900 ± 10	840	1000
2000	2450	1900 ± 10	840	1710

(1) 25 mm must be added on each side to the indicated cubicle width, i.e. 50 mm in all per cubicle. This applies to all cubicle installation cases.

When installing several cubicles, allow for a tolerance of 0/+3mm per metre.

## External maintenance bypass cubicles

**Characteristics of external maintenance bypass cubicles**

(Modular UPS with external maintenance bypass)

rated bypass in kVA	cubicle width W in mm (1)	cubicle height H in mm	cubicle depth D in mm	maximum weight in kg
1200	1200	1900 ± 10	840	450

(1) 25 mm must be added on each side to the indicated cubicle width, i.e. 50 mm in all per cubicle. This applies to all cubicle installation cases.

When installing several cubicles, allow for a tolerance of 0/+3mm per metre.

## "Pack Advance" cubicles

**Characteristics of "Pack Advance" Cubicles**

rated SSC output in kVA	cubicle width W in mm (1)	cubicle height H in mm	cubicle depth D in mm	maximum weight in kg
300	400	1900 ± 10	840	335
400	400	1900 ± 10	840	440
450	400	1900 ± 10	840	440

(1) 25 mm must be added on each side to the indicated cubicle width, i.e. 50 mm in all per cubicle. This applies to all cubicle installation cases.

When installing several cubicles, allow for a tolerance of 0/+3mm per metre.

# Characteristics (cont.)

## Electrical parameters for selecting protective devices

The parameters given in the table opposite can be used to determine the required rating of the source side protective circuit breaker on Mains 1 of a single-unit or modular UPS, a frequency converter, or a parallel UPS with SSC.

**Important:**  
It is essential to choose the type of circuit breaker according to its breaking capacity and the prospective short-circuit current at its place of installation.

**Note:**  
For Mains 1 power supply voltages of 380, 400 and 415V, the Mains 1 current is the same because it is a function of the DC voltage.

Electrical parameters for Mains 1

rated inverter output in kVA	Mains 1 current			
	rated current In for unit:		for 25% overload (3)	for 50% overload (3)
	with battery at start of charge cycle (1)	without battery (2)		
250	447	407	509	611
300	537	490	612	734
400	727	654	818	981
450	775	735	919	1102
500	920	821	1026	1231
600	1089	981	1226	1472

(1) the rated Mains 1 currents (In) have been determined for a rated phase-to-phase voltage of 380V to 415V, a battery with a 15 minute backup time (206 cells at 2V per cell, i.e. 412V) and at the beginning of its recharge cycle, and full rated load with a power factor of 0.8.  
(2) the rated Mains 1 currents (In) have been determined for a minimum float charging voltage of 423V and full rated load with a power factor of 0.8.

(3) the Mains 1 currents given for an overload of 25% or 50% are maximum values. They have been determined for a battery drawing the minimum float charging voltage and a load power factor of 0.8. When choosing the circuit breaker rating, use the "rated current" column and check that the circuit breaker tripping curves are compatible with the values in the overload columns.

The parameters given in the table opposite can be used to determine the required rating of the source side protective circuit breaker on the Mains 2 line for a single-unit or modular UPS.

**Important:**  
It is essential to choose the type of circuit breaker according to its breaking capacity and the prospective short-circuit current at its place of installation. This choice must also be made so as to protect the static switch semiconductors and ensure discrimination with respect to the UPS output fuses (refer to "appendix" chapter).

For an installation with a Static Switch Cubicle, the Mains 2 currents indicated in the table must be multiplied by the number of parallel-connected rectifier-inverter cubicles required to supply the load power (i.e. without taking redundant rectifier-inverter units into account).

**Remark:**  
If the installation includes a transformer on the Mains 2 input, allow for the inrush current caused by magnetization of the transformer windings.

Electrical parameters for Mains 2 (415V)

rated inverter output in kVA	Mains 2 current (1)		
	rated current In	for 25% overload	for 50% overload
250	347	433	519
300	416	519	624
400	556	695	834
450	649	811	973
500	722	902	1083
600	866	1082	1300

(1) the Mains 2 currents have been determined for a rated phase-to-phase voltage of 415V, a load power factor of 0.8 and for full rated load as well as overloads of 25% or 50%. When choosing the circuit breaker rating, use the "rated current" column and check that the circuit breaker tripping curves are compatible with the data in the overload columns. For a Mains 2 voltage of 380V, multiply the currents indicated in this table by 1.09. For a Mains 2 voltage of 400V, use the table in another language version of this manual.

## Electrical parameters for determining cable cross-sections

► this table has been drawn up for rated phase-to-phase Mains and load voltages of 415V. For voltages of 380V, multiply the currents for Mains 2 and load by 1.09; for voltages of 400V, use the table in another language version of this manual;  
 ► the current values and cable cross-sections for Mains 1 are given for full rated load with a power factor of 0.8 and a battery consuming its minimum float charging voltage;

► the battery current values and cable cross-sections have been determined for a battery at the end of a charge cycle;  
 ► the current values and cable sections for Mains 2 and load are given for full rated load with a power factor of 0.8.

For frequency converters, the parameters concerning Mains 2 are not applicable.

The load parameters common to all the converters are given in the table below. For a parallel UPS, the parameters for Mains 2 and load are also provided in the table below.

**For a modular UPS, the parameters for Mains 2 and load are also provided in the table below.**

### Parameters for single-unit UPS cables

rated inverter output in kVA	line currents absorbed in Amps			cross-sectional area of Cu cables in mm <sup>2</sup> (2)					
	Mains 1	415V	battery	Mains 1		415V		battery	
	with or without battery (1)	Mains 2 and load		with or without battery		Mains 2 and load			
				Copper	Aluminium	Copper	Aluminium	Copper	Aluminium
250	407	361	630	185	300	150	240	240	2 x 185
300	490	433	758	240	2 x 150	240	2 x 150	240	2 x 240
400	654	577	1013	2 X 185	2 x 300	2 x 150	2 x 240	2 x 185	3 x 185
450	735	649	1137	2 X 185	2 X 300	2 X 185	2 x 300	2 x 185	2 x 300
500	821	722	1252	2 x 240	4 x 185	2 X 185	2 x 300	3 x 150	3 x 240
600	981	866	1519	3 x 240	4 x 240	2 X 240	4 x 185	3 x 185	2 x 400

(1) the rated Mains 1 currents (I<sub>n</sub>) have been determined for a minimum float charging voltage of 423V and full rated load with a power factor of 0.8.

(2) the cable cross-sections are given for copper conductors. They are calculated according to permissible temperature rise and allow for line voltage drops over a maximum length of 100 m (AC circuits) or 25 m (DC circuits if cables not provided). For greater lengths, the cross-sections should be chosen to limit voltage drops to 3% (AC) or 1% (DC).

**NF C 15-100 authorizes a maximum of 4 cables per phase.**

## Heat losses

### rectifier-inverter cubicles

rated inverter output in kVA	heat losses (1)	
	in kW	in cal./s
250	13,5	3220
300	17,5	4170
400	23	5480
450	25	5960
500	30	7150
600	32,8	7830

(1) the indicated heat losses are those produced by the unit at full rated load and with the battery float charging. They must be taken into account when dimensioning the air conditioning system. The cubicles are cooled by forced ventilation. The air enters via the doors and grids at the bottom and is discharged via the roof.

### static switch cubicles

rated SSC output in kVA	heat losses (1)	
	in kW	in cal./s
500	2,9	696
800	3,7	888
1200	< 0,5	< 120
2000	< 0,5	< 120

(1) the indicated heat losses are those produced by the unit at full rated load when operating on Mains 2. They are not to be taken into account when dimensioning the air conditioning system. The cubicles are cooled by forced ventilation.

### "Pack advance" cubicles

rated inverter output in kVA	heat losses (1)	
	in kW	in cal./s
300	2,2	525
400	2,6	620
450	2,6	620

(1) the indicated heat losses are those produced by the unit at full rated load and with the battery float charging. They must be taken into account when dimensioning the air conditioning system. The cubicles are cooled by forced ventilation. The air enters via the doors and grids at the bottom and is discharged via the roof.

# Characteristics (cont.)

The table opposite serves as an example for an installation comprising up to four frequency converters or four parallel UPSs with a centralised SSC.

► for installations with redundant units, take into account only the units required to supply the load power (e.g. for an installation made up of 3 parallel-connected rectifier-inverter cubicles, one being redundant, only 2 rectifier-inverter cubicles are used to determine Mains 2 and load currents and cable cross-sections);

► this table has been drawn up for rated phase-to-phase Mains 2 and load voltages of 415V and full rated load with a power factor of 0.8. For voltages of 380 or 400V, multiply the indicated currents by 1.09 and 1.04 respectively, then modify the cable cross-sections accordingly if necessary.

The cable cross-sections in this table are for the parts illustrated in bold on the following block diagrams (installation examples, figures 1 and 2).

Parameters for Mains 2 and load cables for an installation comprising frequency converters or parallel UPSs with a centralised SSC.

rated inverter output in kVA	number of parallel-connected inverters	total UPS rated output in kVA	Mains 2 or load line current in Amps	cable cross-section (1) in mm <sup>2</sup>	
				Copper	Aluminium
250	2	500	722	2 x 185	2 x 300
	3	750	1082	3 x 300	4 x 240
	4	1000	1444	4 x 240	4 x 400
300	2	600	866	2 x 240	4 x 185
	3	900	1299	4 x 240	4 x 400
	4	1200	1732	Please consult us*	
400	2	800	1298	4 x 185	4 x 300
	3	1200	1947	Please consult us*	
	4	1600	2596	Please consult us*	
450	2	900	1154	4 x 240	4 x 400
	3	1350	1731	Please consult us*	
	4	1800	2308	Please consult us*	
500	2	1000	1444	4 x 240	4 x 400
	3	1500	2164	Please consult us*	
	4	2000	2888	Please consult us*	
600	2	1200	1731	Please consult us*	
	3	1800	2598	Please consult us*	
	4	2400	3462	Please consult us*	

(1) cable cross-sections are given for copper conductors of the U1000 R02V type. They are calculated according to permissible temperature rise and allow for line voltage drops over a

maximum length of 100 m. For greater lengths, the cross-sections should be chosen to limit voltage drops to 3%.

NF C 15-100 authorizes a maximum of 4 cables per phase.

Installation with parallel frequency converters

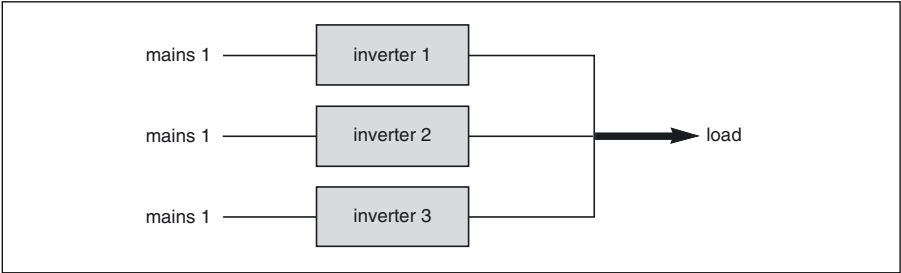


Fig. 1

Installation with parallel UPSs with a centralised SSC

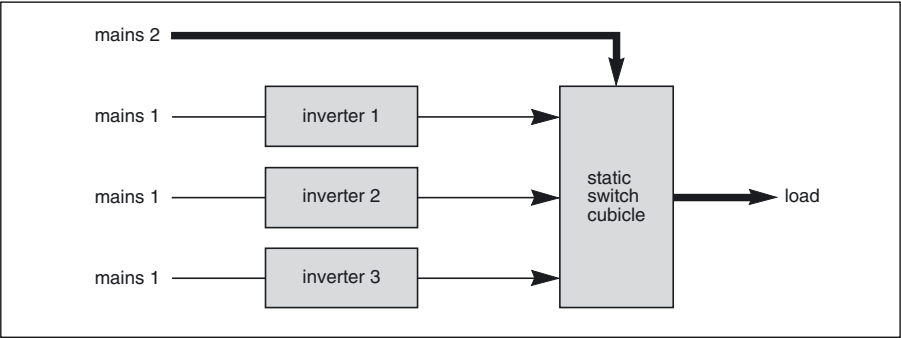


Fig. 2



The table opposite serves as an example for an installation with up to four modular UPSs with an external maintenance bypass.

► for installations with redundant units, take into account only the units required to supply the load power (e.g. for an installation made up of 3 parallel-connected rectifier-inverter cubicles, one being redundant, only 2 units are used to determine the currents on the maintenance bypass line and the load, and the cross-sectional areas of cables);

► this table has been drawn up for rated phase-to-phase Mains 2 and load voltages of 415V and full rated load with a power factor of 0.8. For voltages of 380 or 400V, multiply the indicated currents by 1.09 and 1.04 respectively, then modify the cable cross-sections accordingly if necessary.

The cable cross-sections in this table are for the parts illustrated in bold on the following block diagrams (installation example, figure 3);

► **important.** In an installation with an external maintenance bypass, the power cables **between each UPS and the upstream protection devices** must be the same length. The same holds for the power cables between **each UPS cubicle and the external maintenance bypass**.

## Parameters for connection of the external maintenance bypass circuit and the load in an installation comprising modular UPSs

rated inverter output in kVA	number of parallel-connected inverters	total UPS rated output in kVA	Mains 2 or load line current in Amps	cable cross-section (1) in mm <sup>2</sup>	
				Copper	Aluminium
250	2	500	722	2 x 185	2 x 300
	3	750	1082	3 x 300	4 x 240
	4	1000	1444	4 x 240	4 x 400
300	2	600	866	2 x 240	4 x 185
	3	900	1299	4 x 240	4 x 400
	4	1200	1732	Please consult us*	
400	2	800	1154	4 x 185	4 x 300
	3	1200	1731	Please consult us*	
	4	1600	2308	Please consult us*	
450	2	900	1299	4 X 240	4 x 400
	3	1350	1948	Please consult us*	
500	2	1000	1444	4 X 240	4 x 400
	3	1500	2166	Please consult us*	

(1) cable cross-sections are given for copper conductors of the U1000 R02V type. They are calculated according to permissible temperature rise and allow for line voltage drops over a maximum length of 100 m. For greater lengths, the cross-sections should be chosen to limit voltage drops to 3%.

**NF C 15-100 authorizes a maximum of 4 cables per phase.**

## Installation comprising modular UPSs with an external maintenance bypass

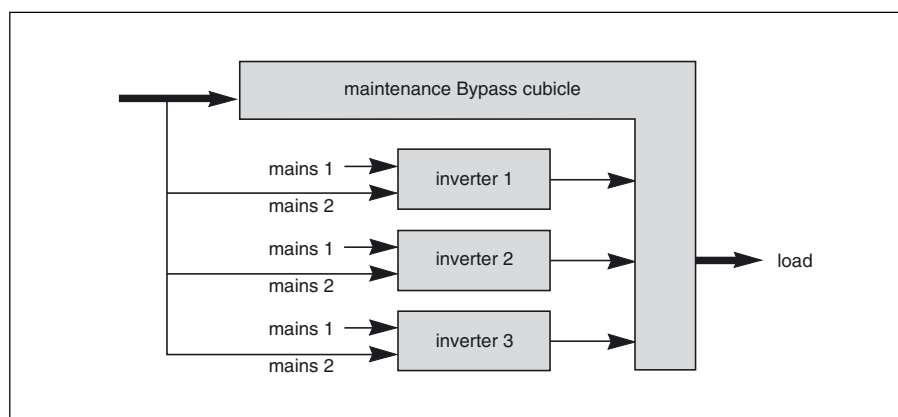


Fig. 3

# Installation

(to be carried out by qualified personnel only)

## Handling

Unpacked cubicles may be moved using a forklift from the front or from the back. Distances must not exceed a few meters.

## Positioning the cubicles

(for 600 kVA UPSs, see the appendix as well)

- ▶ prior to moving the cubicles to their final position, remove the packing material and withdraw the base panels from the space on the side created by the spacing uprights. The panels will be installed at the end of the installation procedure;
- ▶ spacing uprights on the sides of the cubicles create a 50 mm clearance when cubicles are positioned next to each other, enabling users to open the doors (see figure 4). If a cubicle is installed next to a wall, leave additional space so that the cubicle is 50 mm from the wall;
- ▶ when the spacing uprights are not required (cubicles are not positioned next to a wall or another cubicle), they may be removed:
  - ▷ loosen the four screws securing the upright,
  - ▷ lift the upright and pull it free,
  - ▷ replace the long gold-coloured screws with the black screws supplied in a bag attached to the cable terminals in the cubicle;
- ▶ adjust the height of the feet until the first cubicle is perfectly vertical; adjust the feet of the subsequent cubicles so that the all the doors are perfectly aligned.

Side clearances provided by the spacing uprights

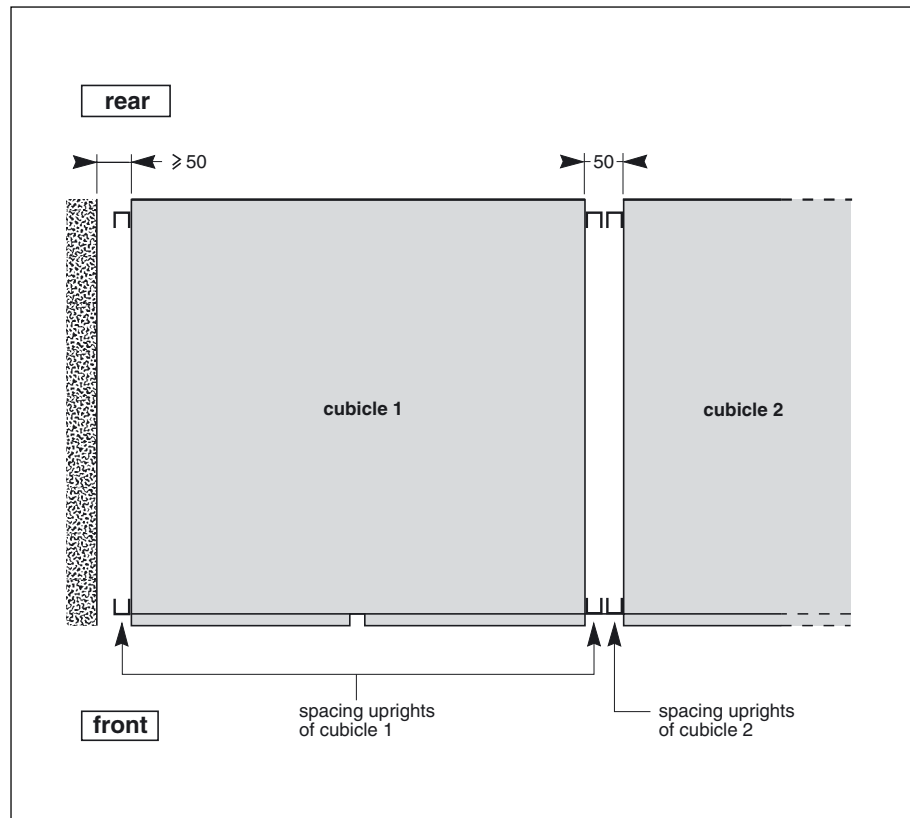


Fig. 4

## Floor loads (figure 5)

- the floor supports the weight of each cubicle via the four 60 mm diameter pads at the bottom of the feet screwed into the corners of the frame;
- the exact locations of the footpads are indicated in the figure;
- normally the cubicles do not have to be secured to the floor; the footpads nevertheless have holes with an average depth of 12 mm designed for the fitting of M16 anchor bolts;
- to determine the stresses applied by the cubicle feet on the floor, divide the cubicle weight (see the first 3 tables of this manual) by the total area of the 4 footpads (110 cm<sup>2</sup>).

### Cubicle footpads

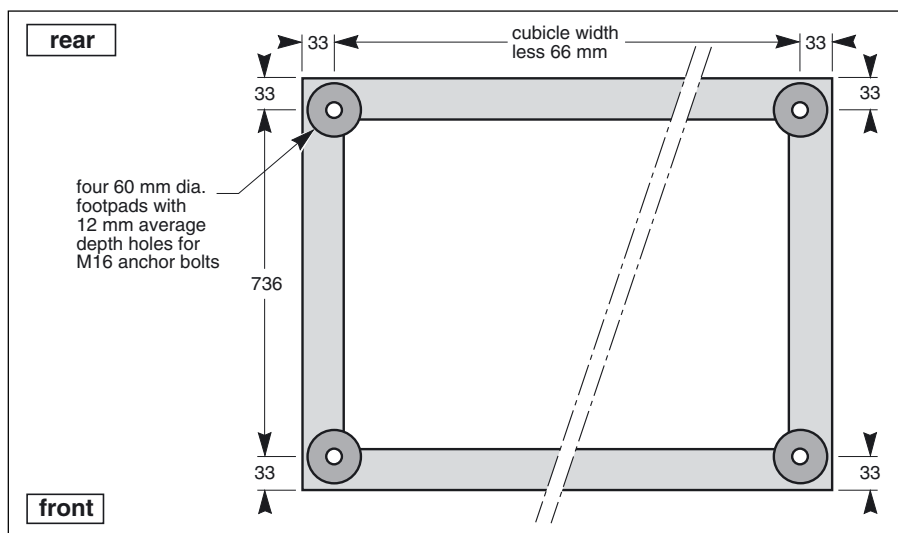


Fig. 5

## Cubicle layout on false floor or normal floor (figures 6, 7, 8)

- the cubicles can be installed directly up against the rear wall;
- an overall clearance of 400 mm must be left above the entire surface of the cubicles for ventilation;
- a side clearance of 25 mm is provided by the vertical bars on the sides of the cubicles to allow door opening. For cubicles mounted side by side, the two adjacent bars ensure an inter-cubicle clearance of 50 mm;
- a minimum clearance of 1000 mm is required in front of the cubicles to allow complete opening of the doors and easy access for maintenance work (replacement of subassemblies);
- for extended battery backup times or high output systems, the UPS may have several battery cubicles (see the table at the end of the previous chapter). If this is the case, install the battery cubicles on the left side of the rectifier-inverter cubicle with the cubicle containing the battery circuit breaker QF1 closest to the rectifier-inverter cubicle (figure 7);
- when an auxiliary cubicle is included in the UPS, it should be installed to the left of the battery cubicle(s);
- connection via the bottom**  
The connection cables may be run in three ways:
  - in a cable trench running underneath the front of the cubicles (see trench dimensions and layout in figure 6),
  - under a false floor.
 A cutout must in this case be made in the floor for cable entry (see figure 6 for dimensions),

### Layout for a single-unit UPS with one battery cubicle

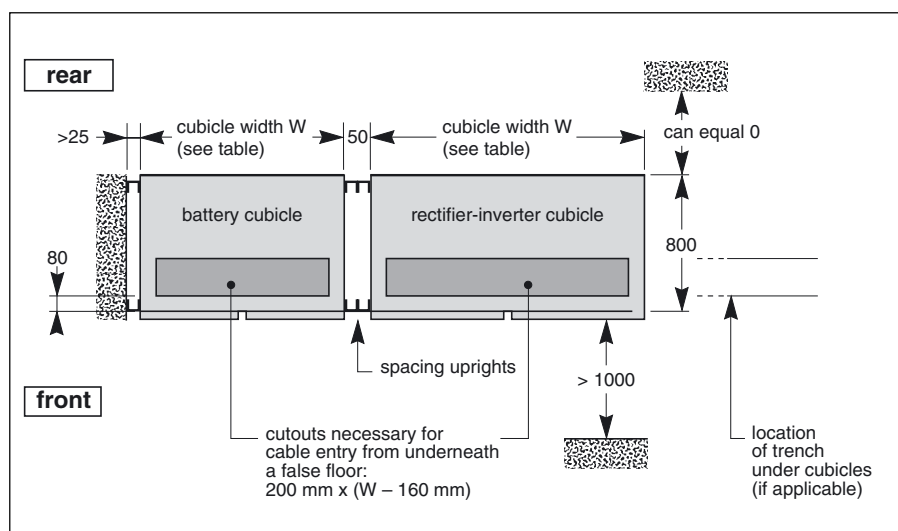


Fig. 6

### Layout for a single-unit UPS with several battery cubicles

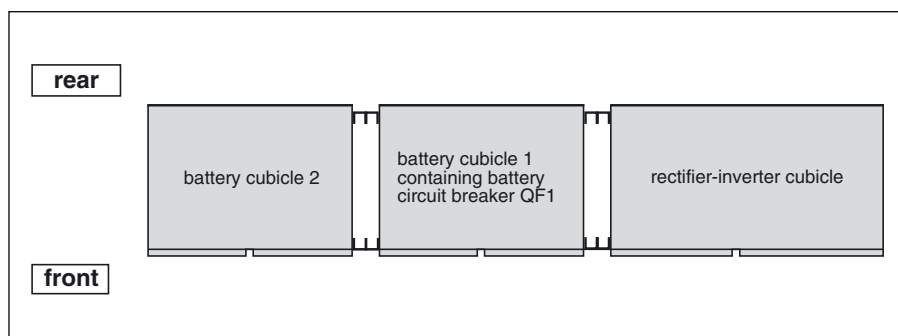


Fig. 7

# Installation (cont.)

On the floor under the cubicles, in the free space equal to the height of the feet. In this case the cables should be run side by side to avoid blocking the flow of air for ventilation. The cables exit from the rear or sides of the cubicles;

► **connection via the top**

the Static Switch, filter and auxiliary cubicles are designed for connection via the bottom or top,

for the rectifier-inverter cubicles, a special 400 mm wide connection duct must be added to the right of the cubicle to allow connection via the top.

Layout for an installation with two parallel UPSs and a centralised SSC

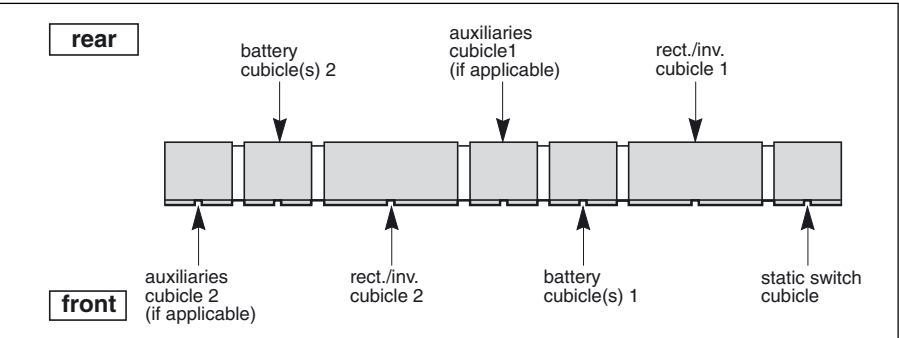


Fig. 8

## Power circuit wiring diagrams

The single-wire diagrams for typical UPS installations are given in figures 9 to 15. The heavy lines represent the cables that must be connected (see the table in the previous chapter for the required cross-sectional areas of the cables).

**Note:**

- for frequency converters, the input and output frequencies may be different (50 or 60Hz);
- for frequency converters without batteries, ignore the battery cubicles and the + and - cables shown in the diagram.

**Special case:**

The UPSs can be optionally supplied with the neutral conductor not interrupted by switches Q4S, Q3BP and Q5N.

Diagram for a single-unit or single modular UPS with separate Mains 1 and 2

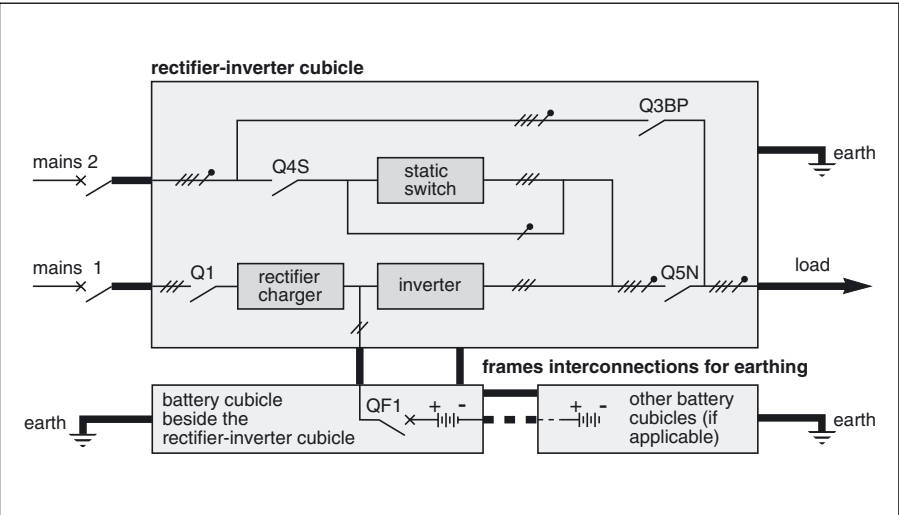


Fig. 9

Diagram for a single-unit or single modular UPS with common Mains 1 and 2

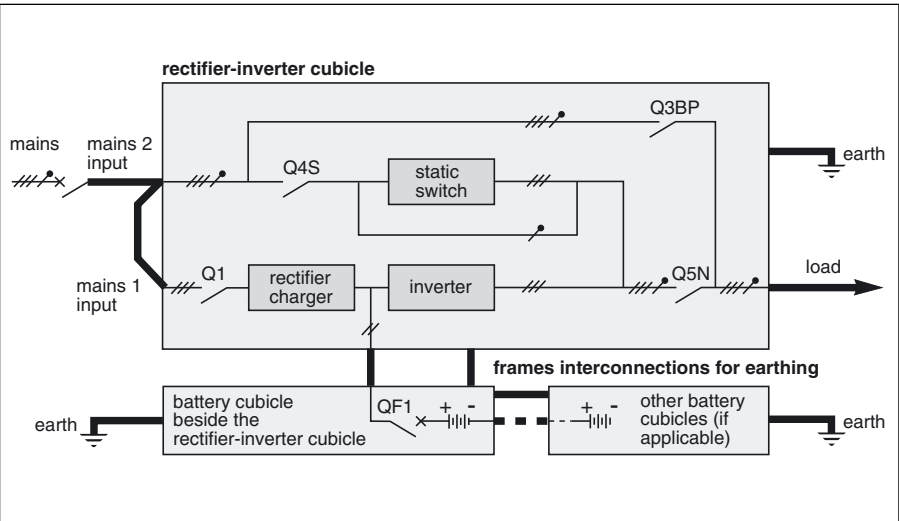
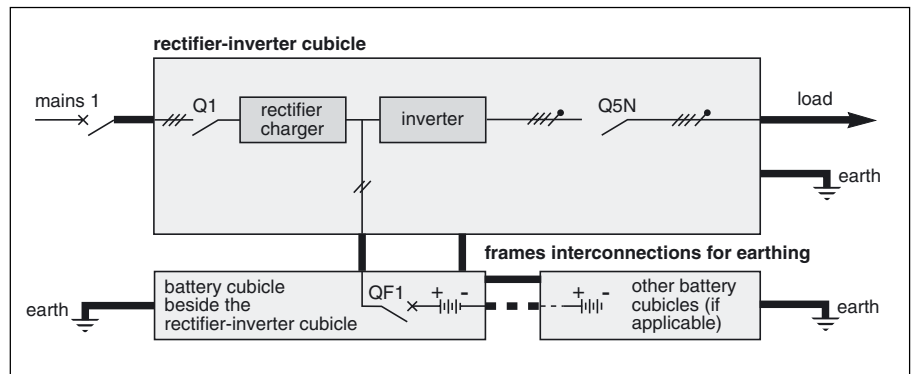


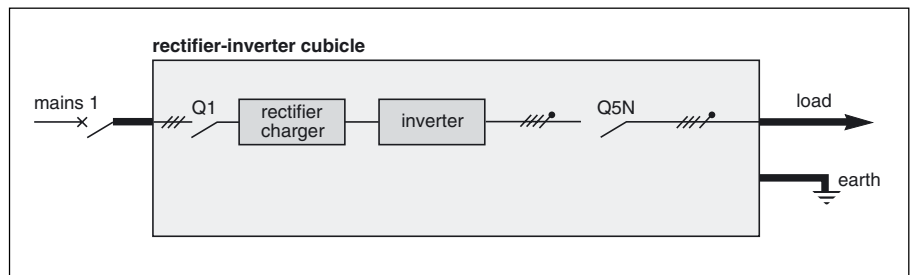
Fig. 10

**Diagram for a frequency converter with batteries**



**Fig. 11**

**Diagram for a frequency converter without batteries**

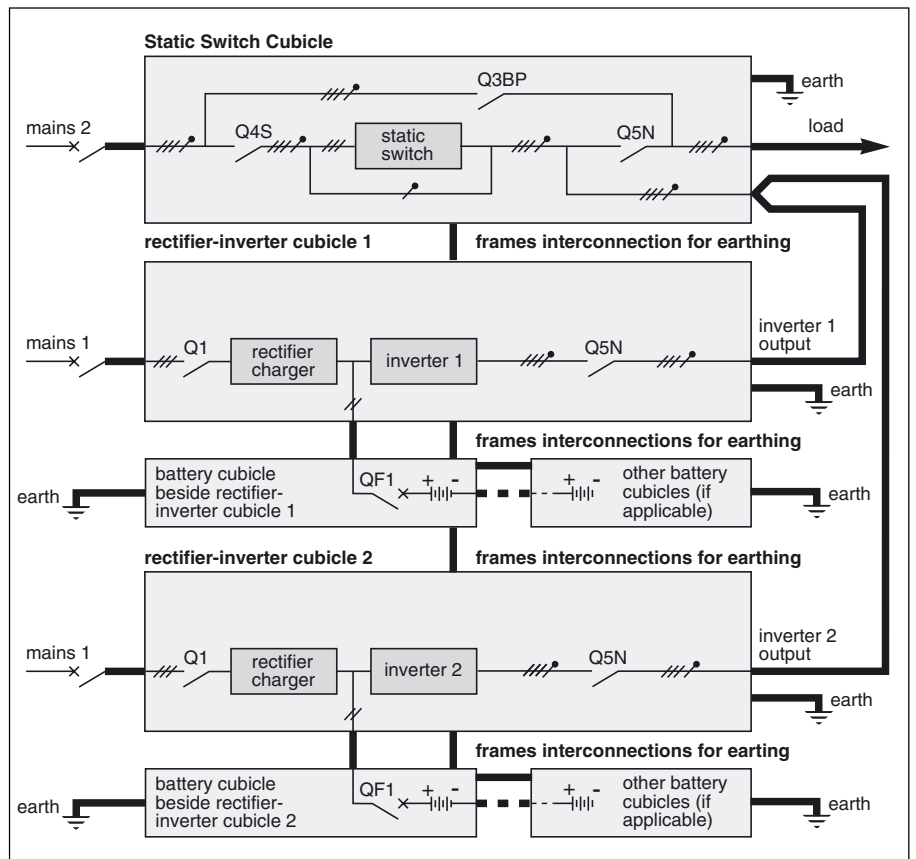


**Fig. 12**

**Example of a 2 parallel UPS rectifier-inverters with SSC**

**Note:**

Both the rectifier-inverter cubicles and the Static Switch Cubicle can be supplied from a common mains, in which case there is only one upstream circuit breaker (same as the case of a single-unit UPS with a common Mains 1 and 2).



**Fig. 13**

# Installation (cont.)

Example of 2 multi-bypass modular UPS cubicles for redundancy (from 250 to 500kVA)

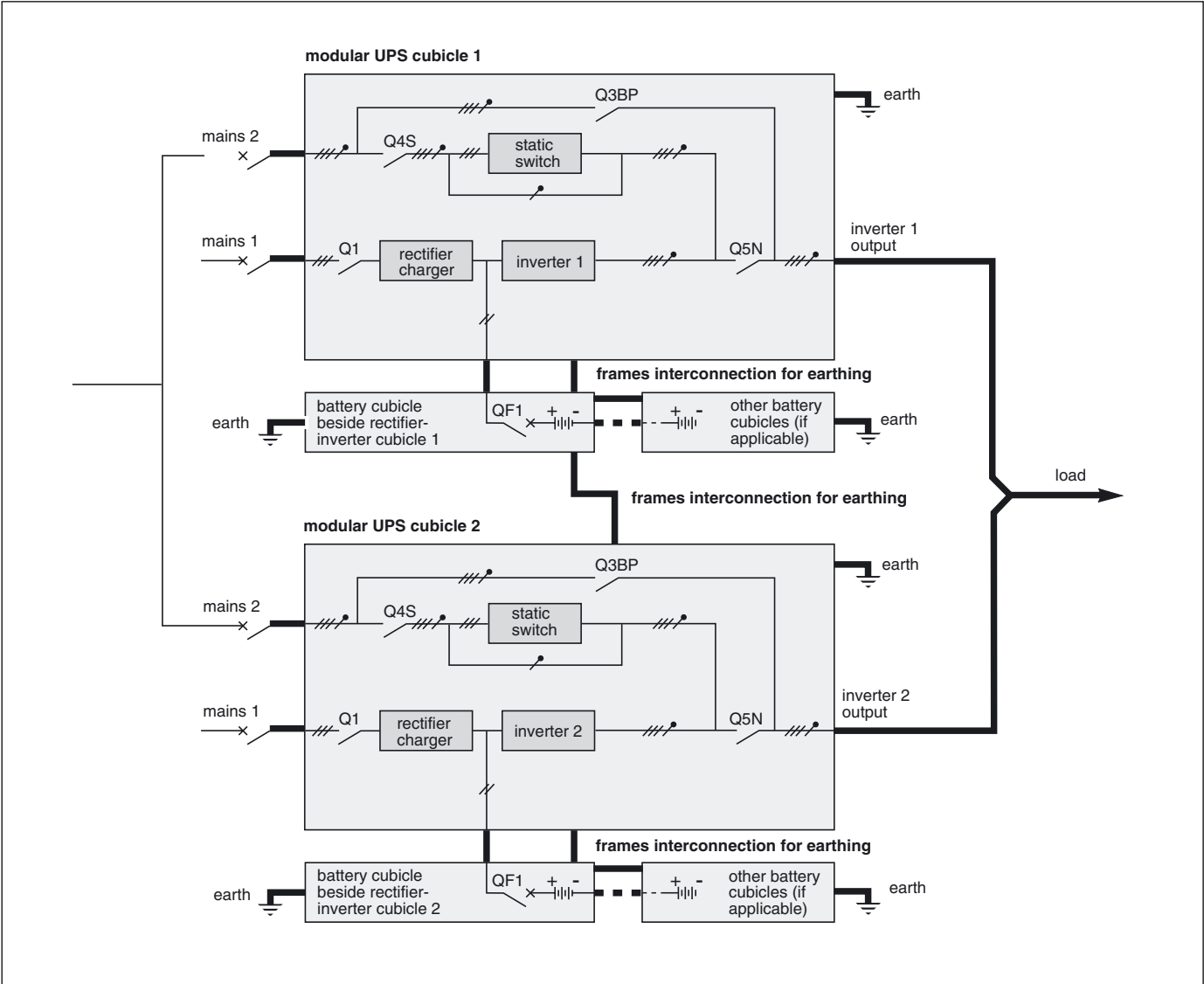
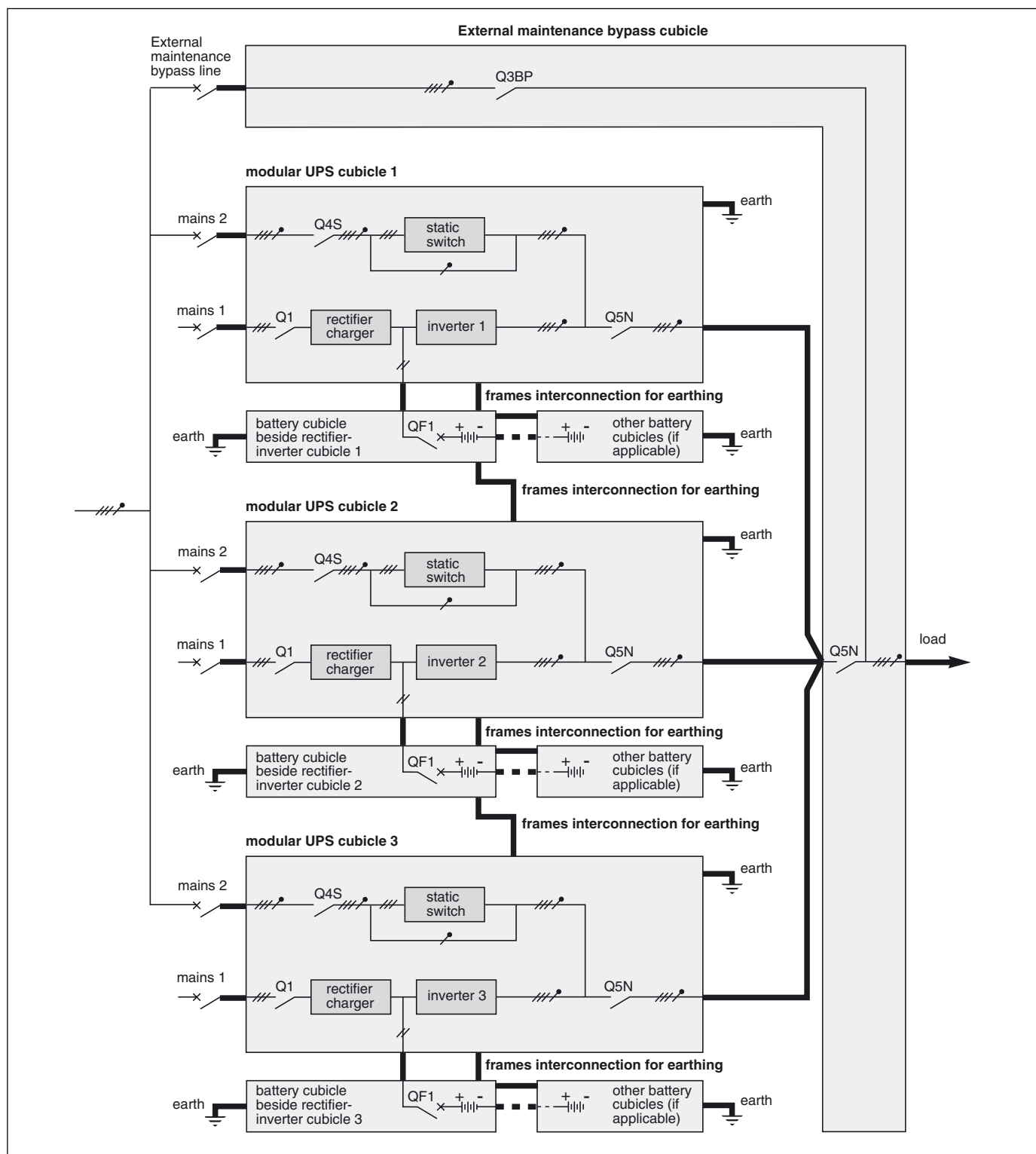


Fig. 14

**Example of an installation comprising three modular UPSs with an external maintenance bypass (from 250 to 500 kVA)**



**Fig. 15**

**Important.** The power cables **between each UPS and the upstream protection devices** must be the same length. The same holds for the power cables between **each UPS cubicle and the external maintenance bypass**.

# Installation (cont.)

## Connection of power circuits

Before making connections, check that switches Q1, Q4S, Q3BP and Q5N are in the "open" position (toggle opposite the "O" mark).

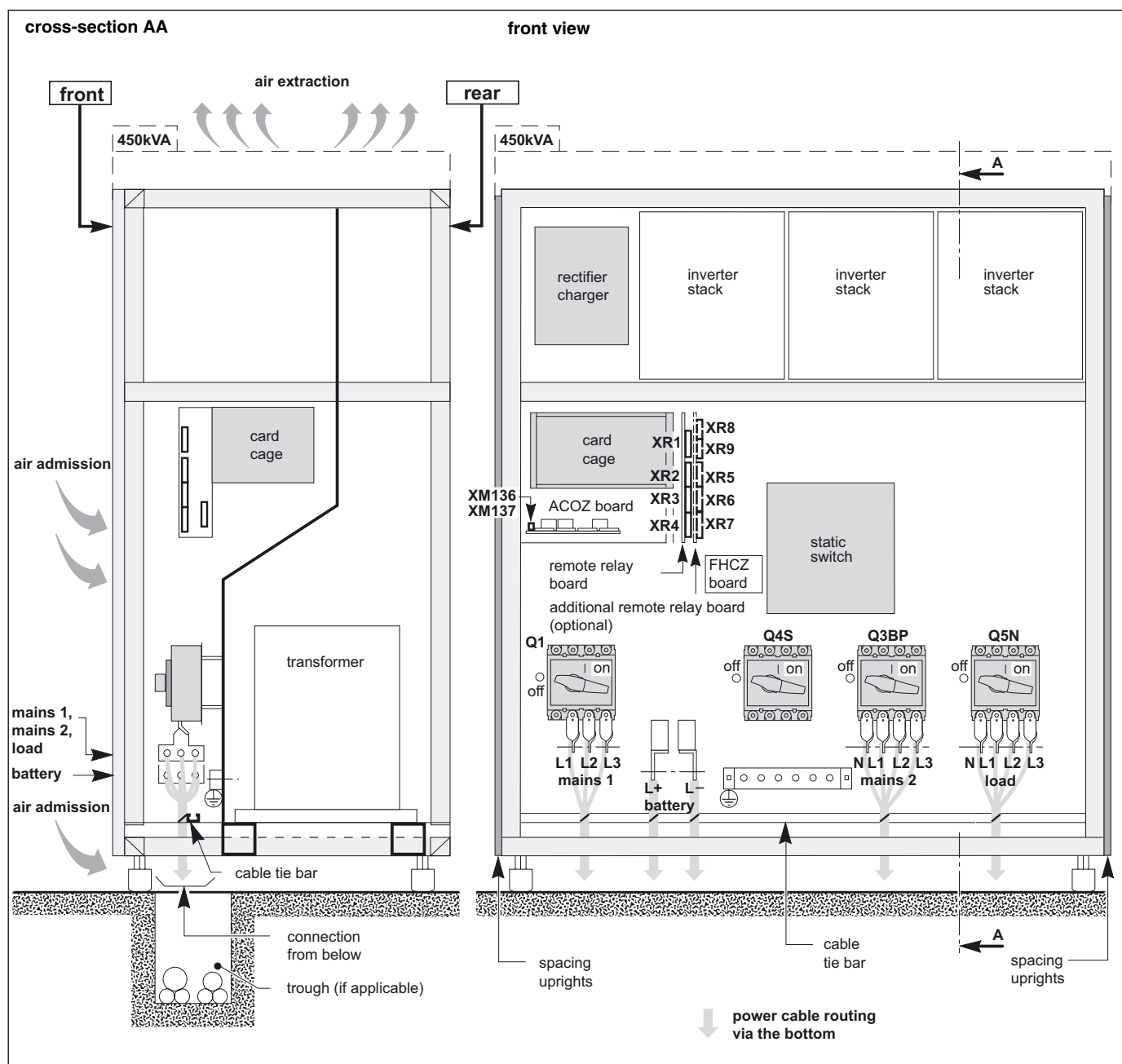
### General:

- in the case of parallel-connected rectifier-inverter cubicles with SSC, switches Q4S and Q3BP are not included and mains 2 is connected to the Static Switch Cubicle. The other connections are the same;
- for modular UPSs with an external maintenance bypass, switch Q3BP must be locked open;

- the power cables for the connections between cubicles are not supplied;
- open the doors and remove the lower terminal shields (secured by screws to the cubicle chassis) of the rectifier-inverter and Static Switch Cubicles;
- connect the cables shown in heavy lines in the wiring diagrams shown previously to the terminals specified in the figures below;
- each cubicle must be earthed;
- the routing of the power cables is shown in the figures;

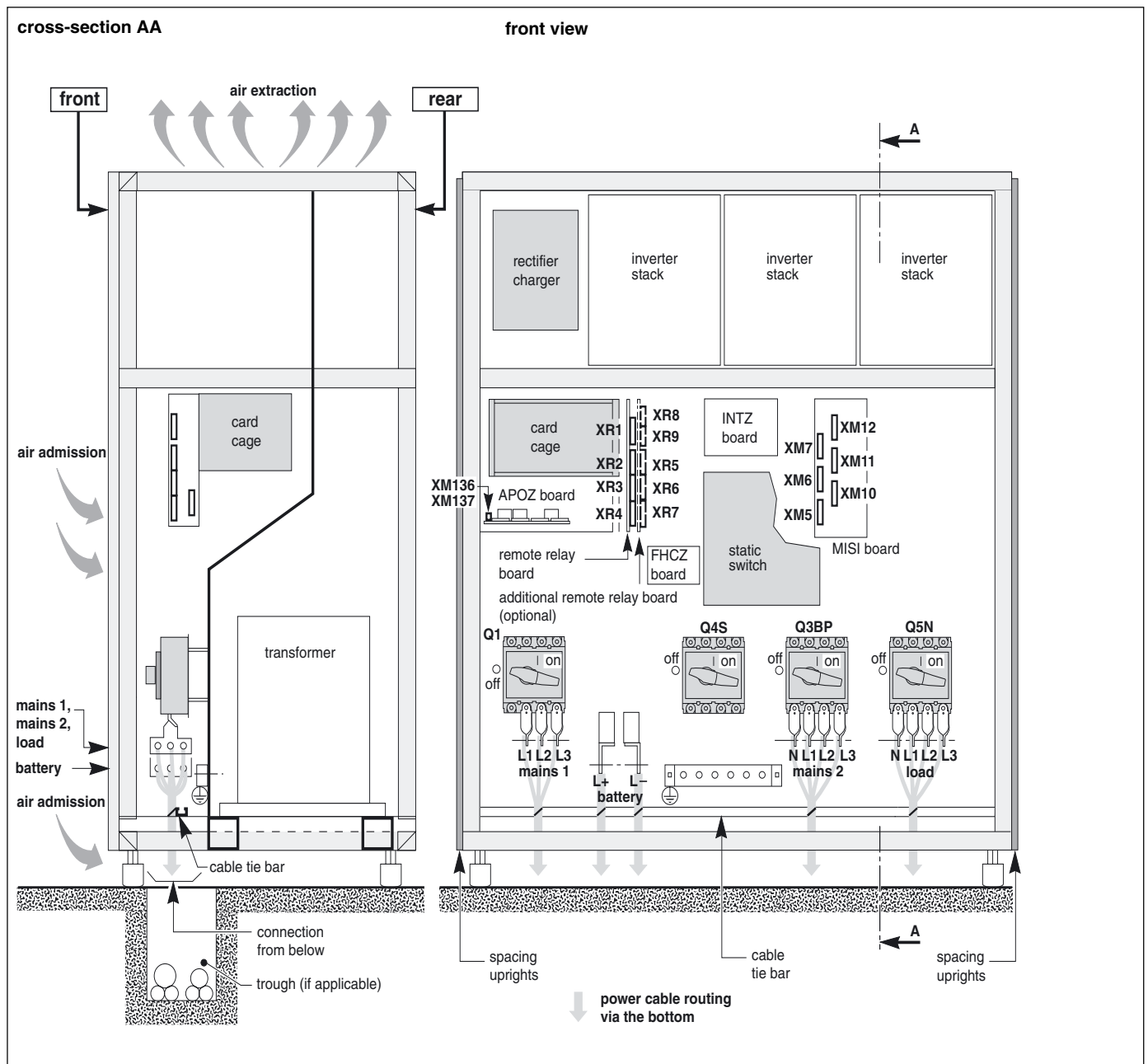
- the auxiliary wiring is routed in troughs located nearby (not shown in the drawings);
- outside the cubicles, separate the auxiliary wiring from the power cables;
- all the cubicles must be interconnected for earthing, forming a mesh which is itself connected to the building structure and earthing electrode;
- the connection drawings hereafter show the cubicles with doors open and terminal shields removed.

## 250kVA to 450kVA single-unit UPS rectifier-inverter cubicle





## 160kVA to 400kVA modular UPS rectifier-inverter cubicle



Cables connect by lugs:

- mains 1, mains 2 and load:  
to 40 X 4 mm copper terminals and  
13 mm diameter holes;

► battery:

▷ 250 to 300 kVA UPSs:

- to 65 X 4 mm copper terminals and  
13 mm diameter holes,

▷ 400 kVA UPSs: to 80 X 5 mm copper  
terminals and 13 mm diameter holes.

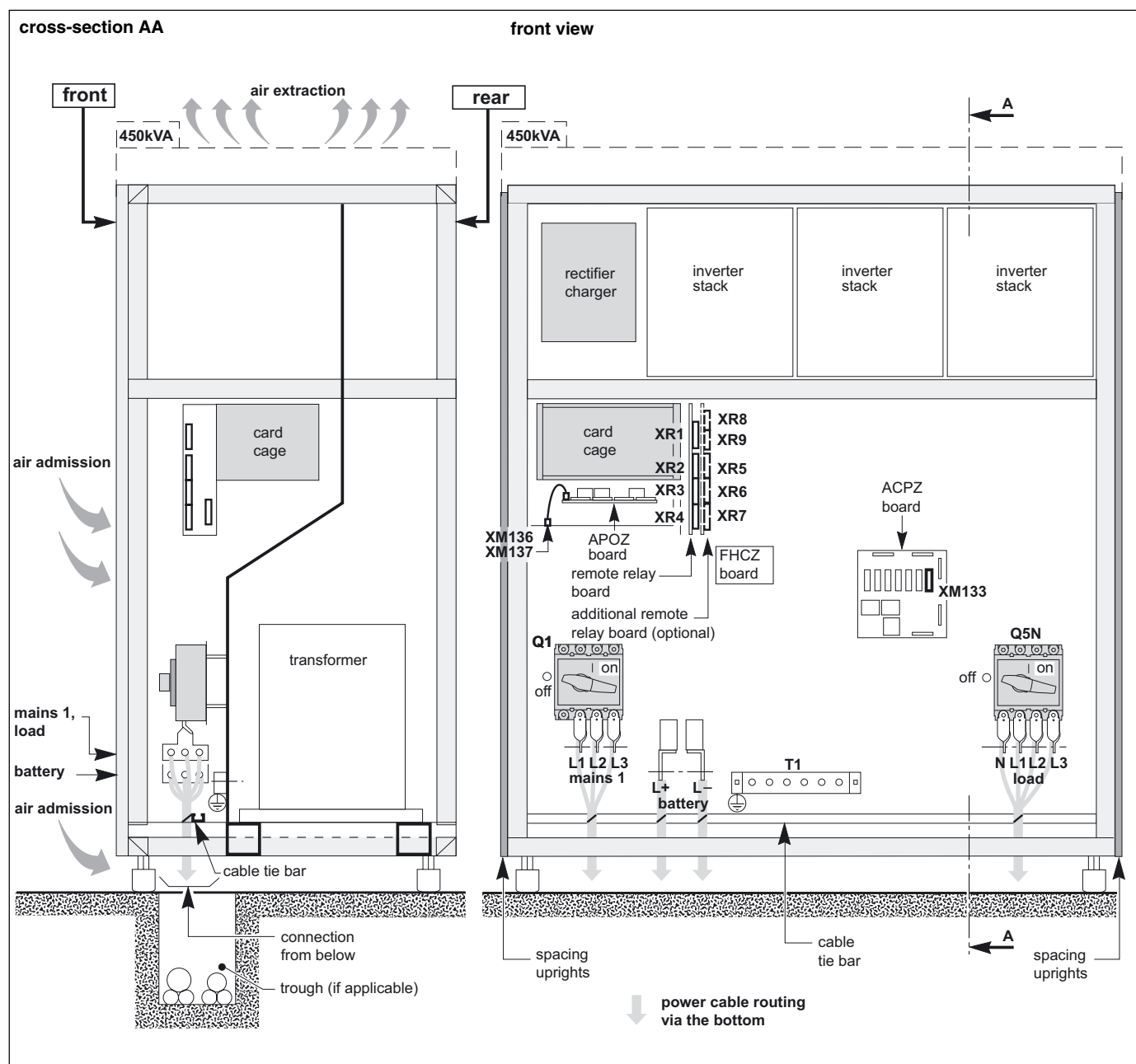
Height of connections relative to floor:

- mains 1, mains 2 and load: 440 mm;
- battery: 390 mm;
- remote relay board: 1030 mm.

600 kVA single-unit UPS cubicles (see the appendix).

# Installation (cont.)

## 250kVA to 450kVA frequency converter or parallel UPS with SSC rectifier-inverter cubicle



Cables connect by lugs:

- mains 1 and load:  
to 40 X 4 mm copper terminals and  
13 mm diameter holes;

- battery:

- ◊ 250 to 300 kVA UPSs:

- to 65 X 4 mm copper terminals and  
13 mm diameter holes,

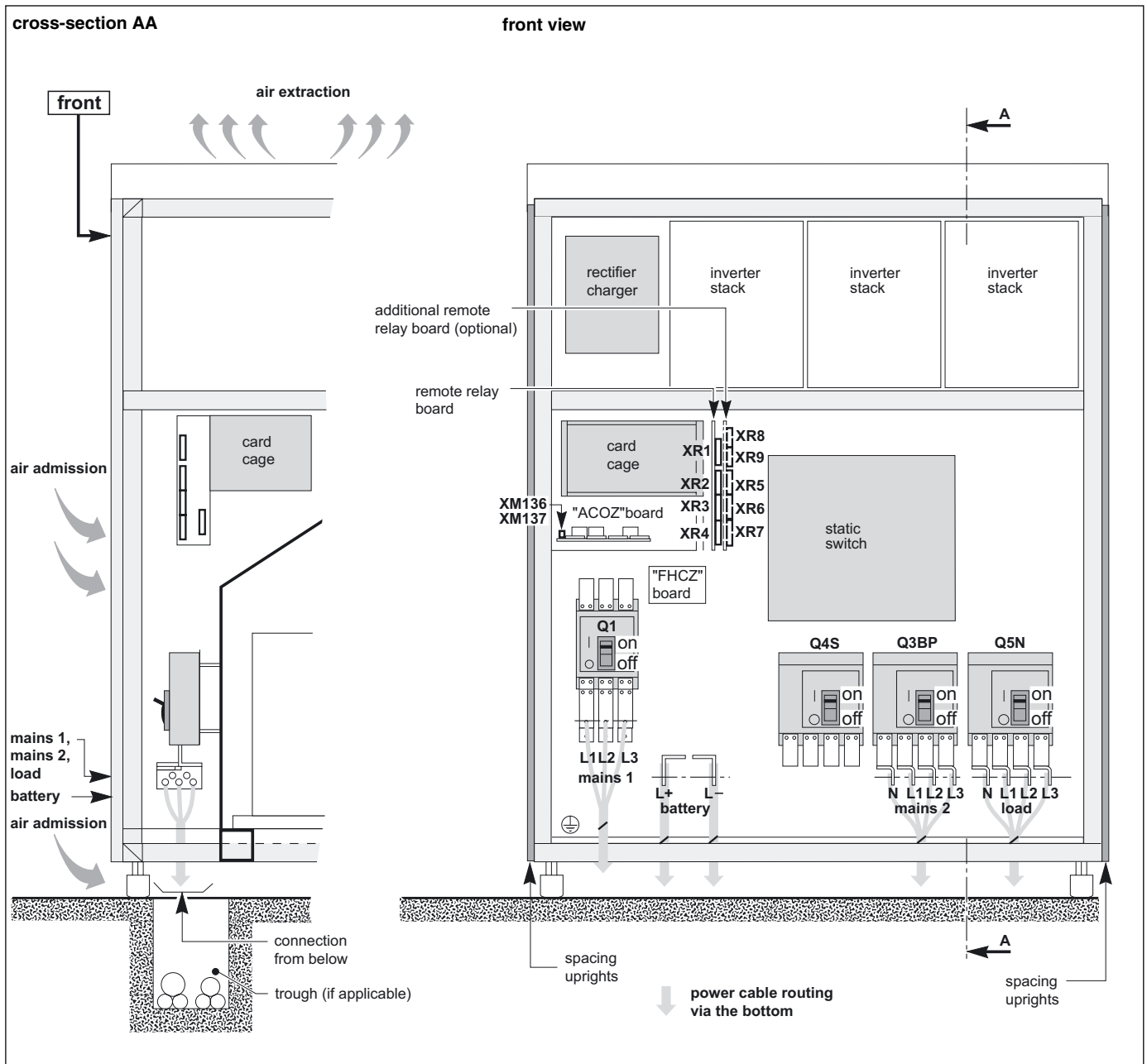
- ◊ 400 kVA UPSs: to 80 X 5 mm copper  
terminals and 13 mm diameter holes.

Height of connections relative to floor:

- mains 1 and load: 440 mm;
- battery: 390 mm;
- remote relay board: 1030 mm.

**600kVA parallel UPS cubicles (see the appendix).**

## 500kVA single-unit UPS rectifier-inverter cubicle



### Cables connect by lugs:

- mains 1:  
to 50 X 10 mm copper terminals and 12,6 mm diameter holes, and gudgeon 10 mm diameter;
- mains 2 and load:  
to 50 X 8 mm copper terminals and 5 holes of 12,6 mm diameter;
- battery:  
to 80 X 8 mm copper terminals and 2 holes of 12,6 mm diameter.

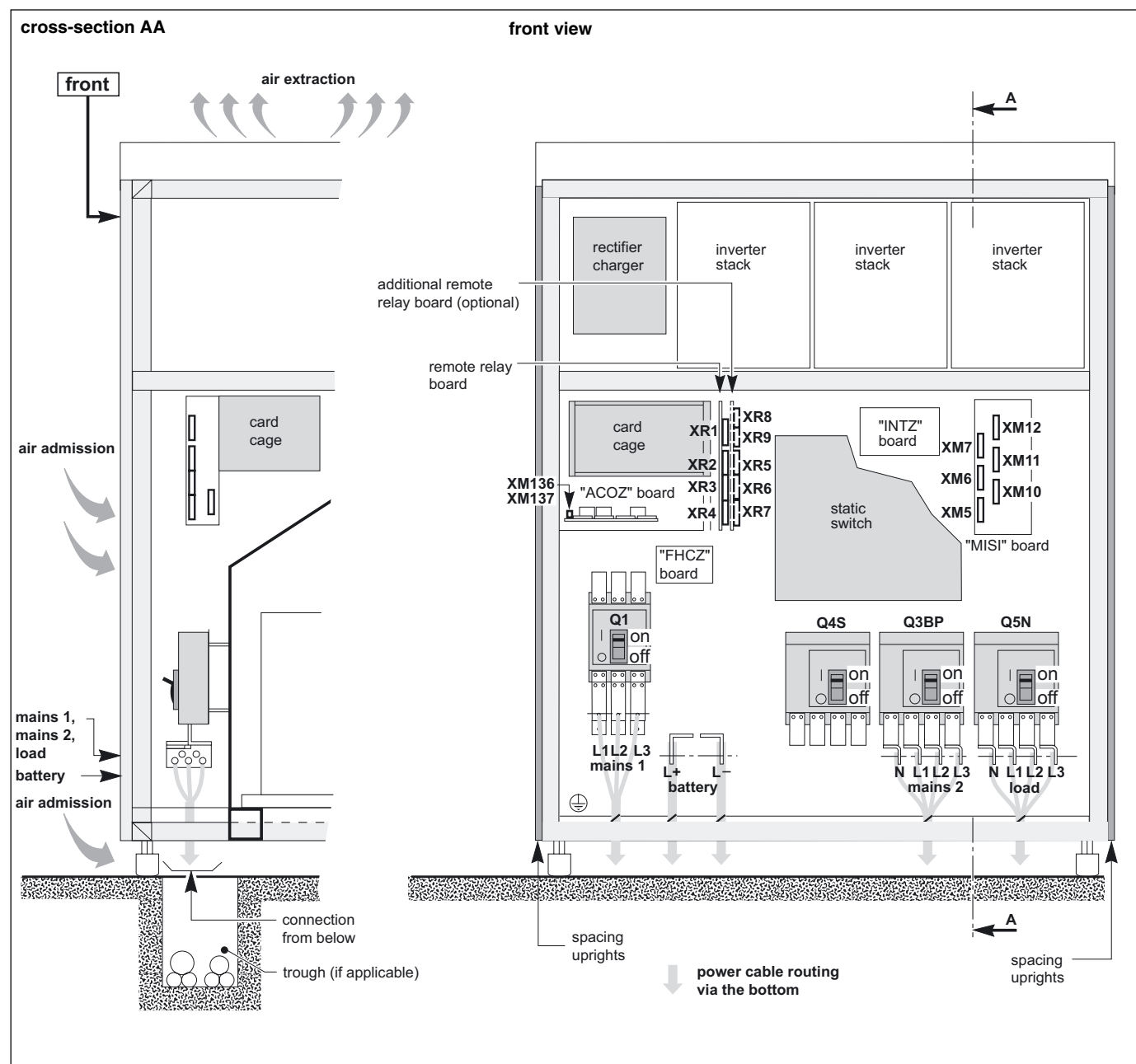
### Height of connections relative to floor:

- mains 1: 450 mm ;
- mains 2 and load: 337 mm ;
- battery: 385 mm ;
- remote relay board: 1030 mm.

600kVA single-unit UPS cubicles (see the appendix).

# Installation (cont.)

## 500kVA modular UPS rectifier-inverter cubicle



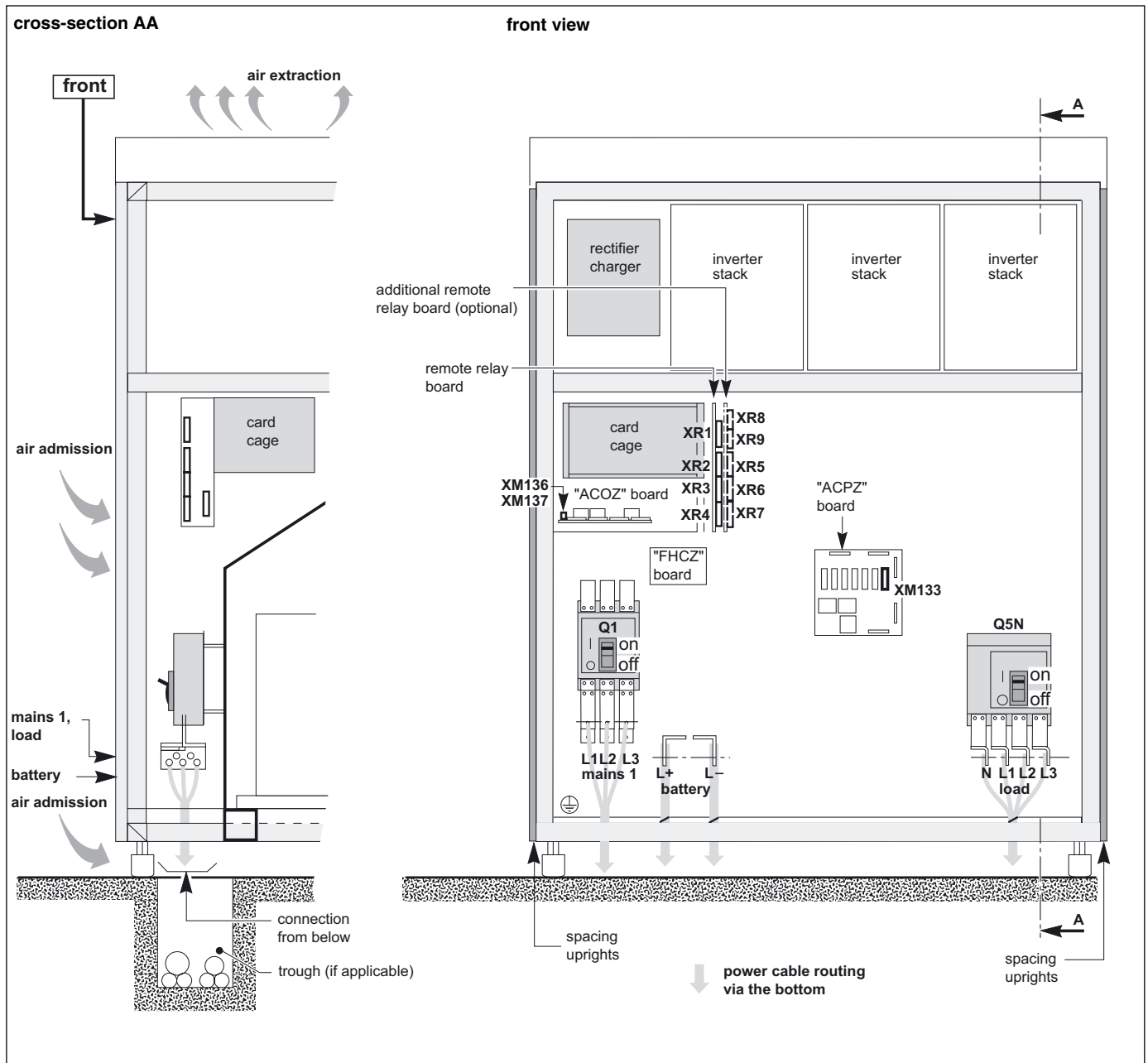
Cables connect by lugs:

- mains 1:  
to 50 X 10 mm copper terminals and 12,6 mm diameter holes, and gudgeon 10 mm diameter;
- mains 2 and load:  
to 50 X 8 mm copper terminals and 5 holes of 12,6 mm diameter;
- battery:  
to 80 X 8 mm copper terminals and 2 holes of 12,6 mm diameter.

Height of connections relative to floor:

- mains 1: 450 mm ;
- mains 2 and load: 337 mm ;
- battery: 385 mm ;
- remote relay board:  
1030 mm.

## 500kVA frequency converter or parallel UPS with SSC rectifier-inverter cubicle



### Cables connect by lugs:

- mains 1:  
to 50 X 10 mm copper terminals and 12,6 mm diameter holes, and gudgeon 10 mm diameter;
- load:  
to 50 X 8 mm copper terminals and 5 holes of 12,6 mm diameter;
- battery:  
to 80 X 8 mm copper terminals and 2 holes of 12,6 mm diameter.

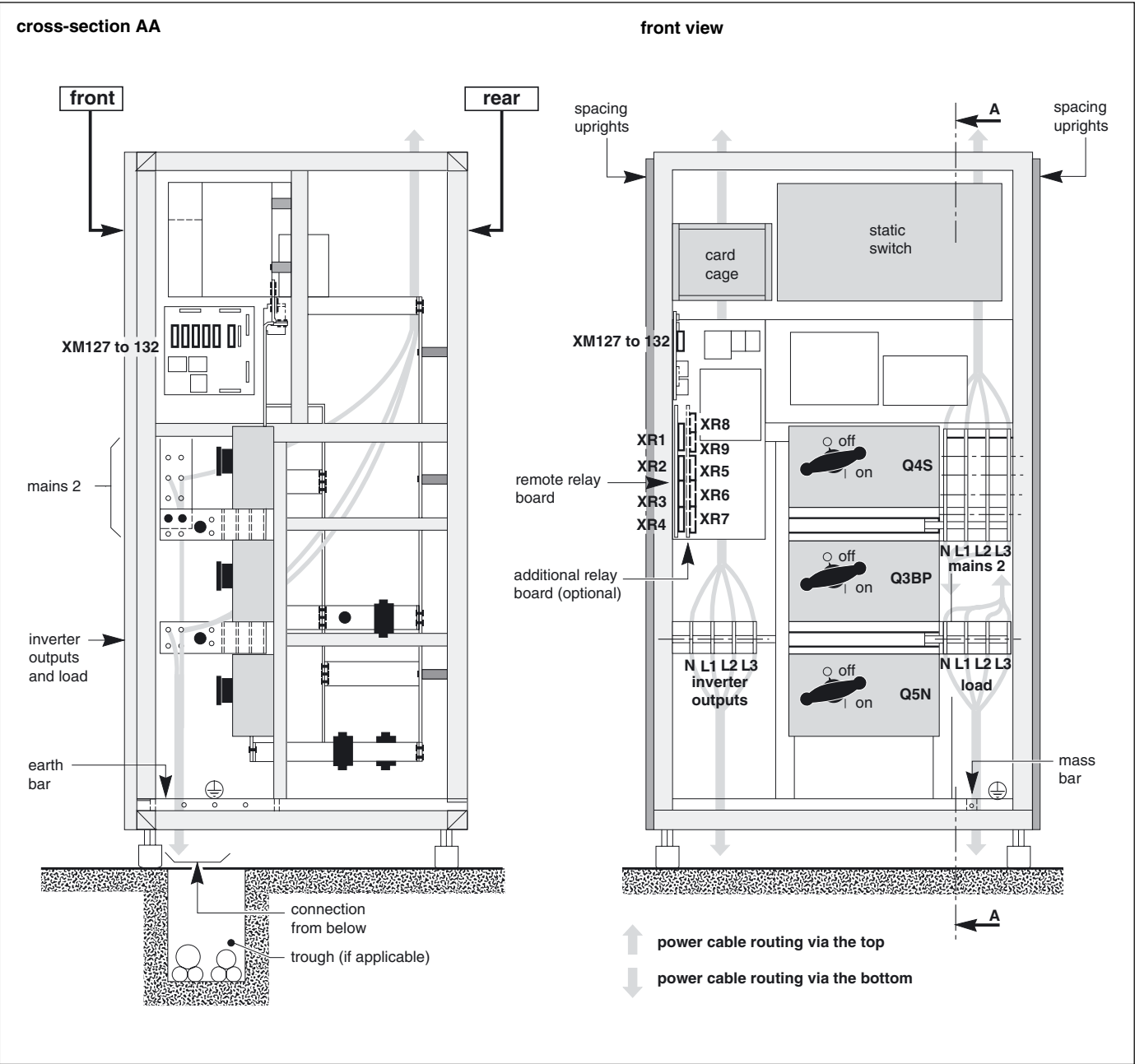
### Height of connections relative to floor:

- mains 1: 450 mm ;
- load: 337 mm ;
- battery: 385 mm ;
- remote relay board: 1030 mm.

600kVA parallel UPS cubicles (see the appendix).

# Installation (cont.)

## 500/800kVA Static Switch Cubicle



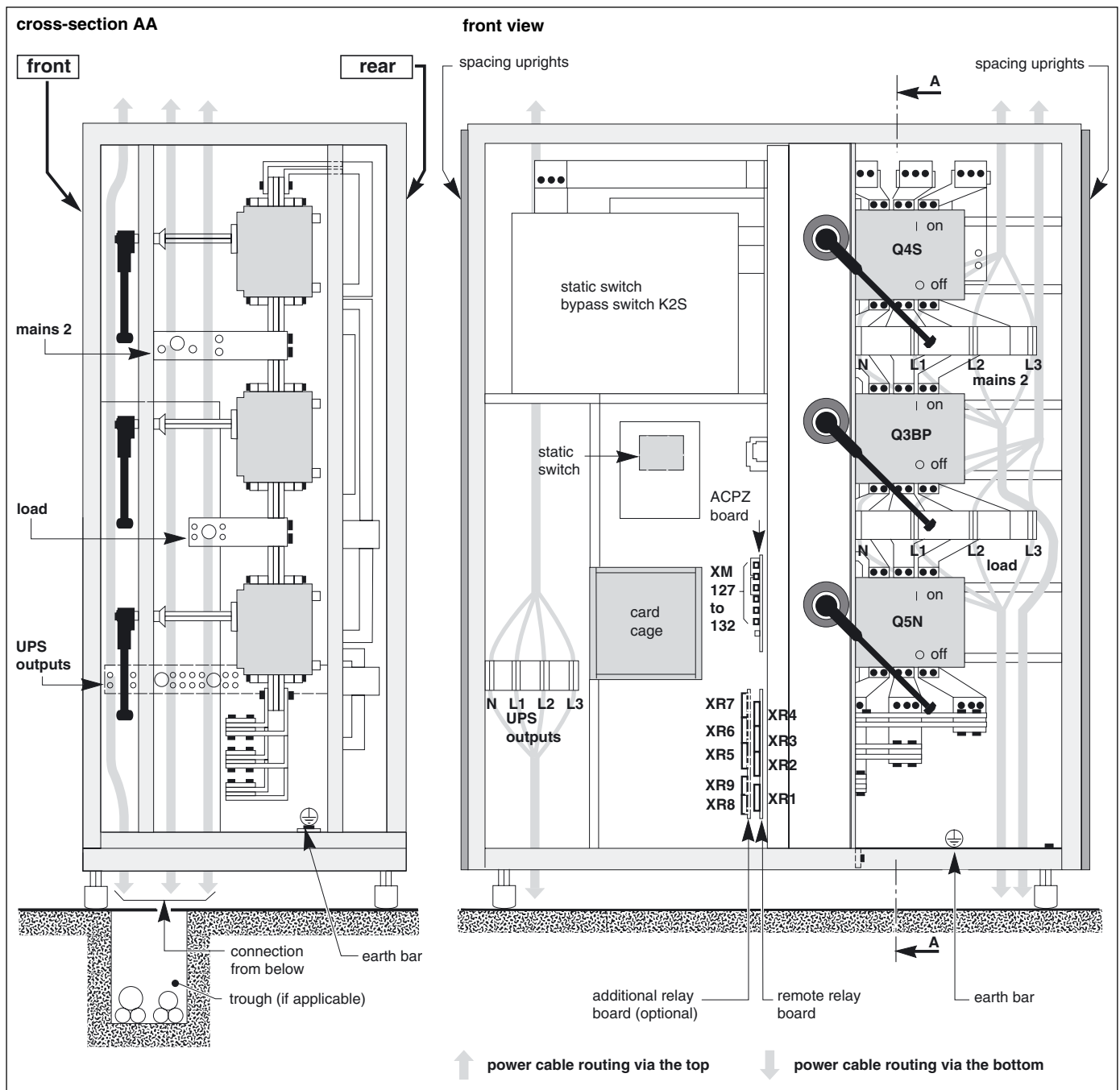
500kVA Static Switch Cubicle:  
Cables connected by lugs to 80 x 5 mm copper terminals and 13 mm diameter holes.

800kVA Static Switch Cubicle:  
Cables connected by lugs to 80 x 8 mm copper terminals and 13 mm diameter holes.

Height of connections relative to floor:

- mains 2: 1050 mm max.;
- inverter outputs and load: 570 mm;
- remote relay board: 1190 mm max.

## 1200kVA Static Switch Cubicle



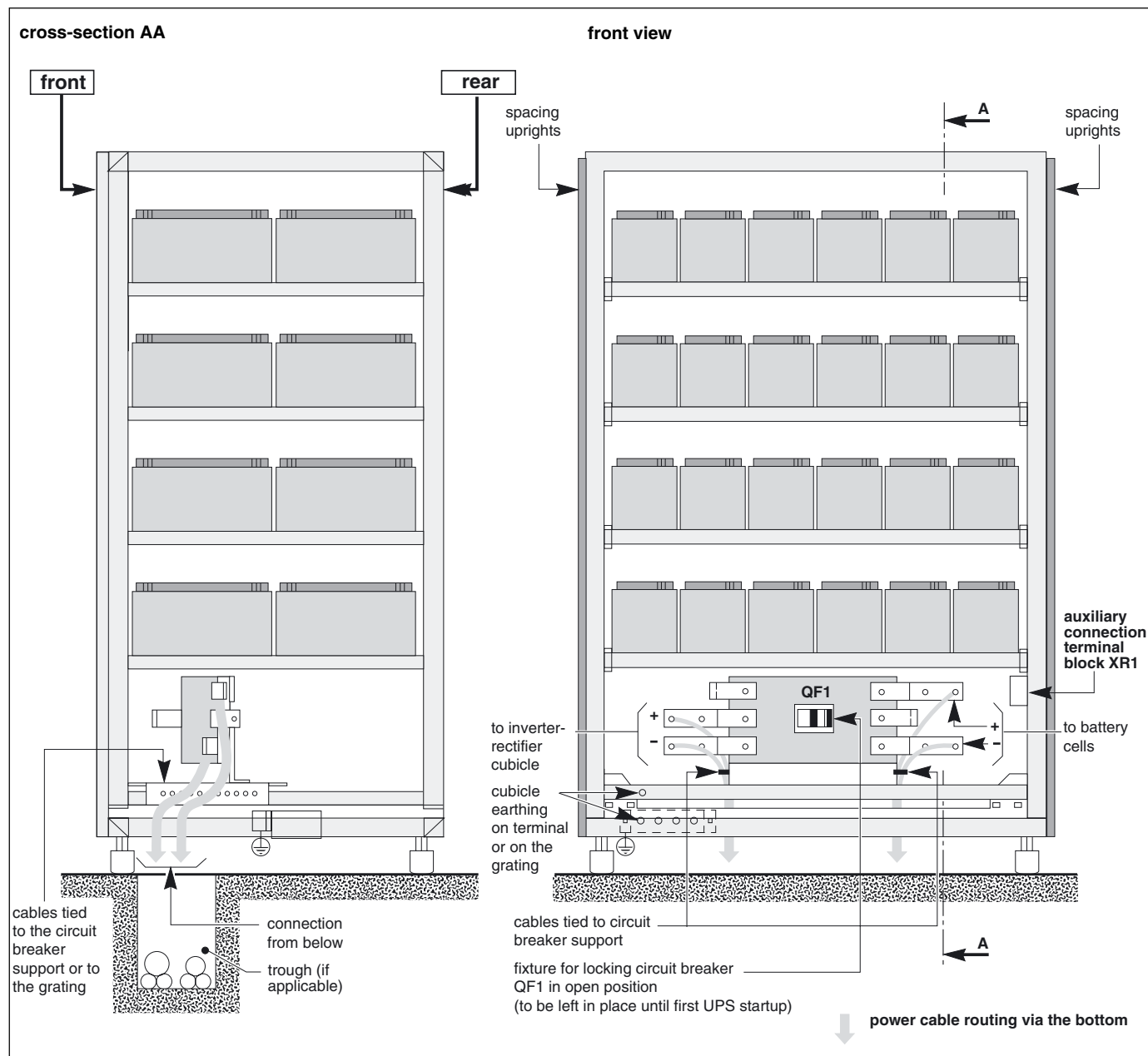
Cables connected by lugs to 80 x 8 mm copper terminals and 14 mm diameter holes.

Height of connections relative to floor:

- ▶ mains 2: 1310 mm;
- ▶ inverter outputs: 550 mm;
- ▶ load: 850 mm;
- ▶ remote relay board: 570 mm max.

# Installation (cont.)

## Battery cubicle (example of cubicle containing battery circuit breaker QF1)



This battery cubicle shown is an example only, given that characteristics of these cubicles vary greatly from one cubicle to another:

- remove the terminal shield from the battery circuit breaker QF1 to make the connections to this circuit breaker;
- in the case of installations having several battery cubicles, the connections to be made between cubicles are indicated in the instructions accompanying the cubicles (or in the drawing file for sophisticated installations);

### Important note:

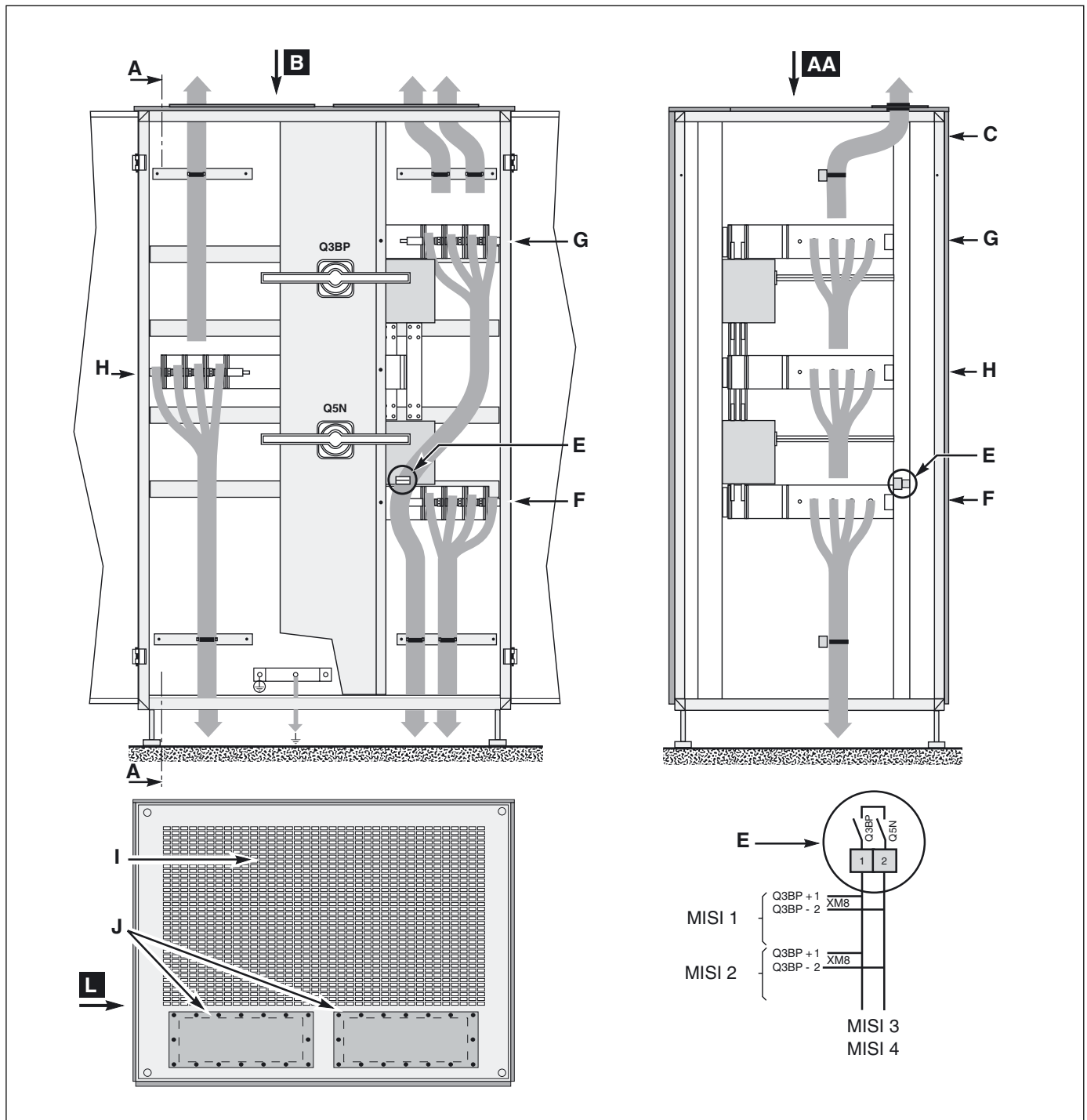
- the cubicle is supplied with a fixture locking circuit breaker QF1 in the open position. **Do not remove this fixture before first startup:** accidental closing of QF1 will power up the downstream circuits which could be hazardous for personnel and permanently damage the battery by deep discharge;
- connections between battery cubicles should be made in compliance with applicable regulations: take all protective measures associated with **working on live equipment** and in particular use only qualified personnel equipped with **gloves, protective goggles, insulated tools, etc.** Connection of cables through lugs to copper terminals

### Note:

The optional "Temperature Monitor" unit is located at the top of the left-hand door in one of the battery cubicles. Cubicles not containing a battery circuit breaker have an additional row of cells at the bottom.



## 1200kVA external maintenance bypass cubicle



### Key to figure:

- AA:** cross-section AA of cubicle,
- B:** cubicle front view,
- C:** front panel,
- E:** connection of auxiliary wires to signal the position of switches Q5N and Q3BP,
- F:** connection of UPS load outputs,
- G:** connection of the maintenance bypass line,
- H:** connection of load,
- I:** air outlet grid,

- J:** openings of 460 x 204 mm for cable insertion,
- L:** top view of cubicle.

**Important.** The power cables **between each UPS and the upstream protection devices** must be the same length. The same holds for the power cables between **each UPS cubicle and the external maintenance bypass**.

**TNC option:** connection of the PEN conductors to the UPS neutral bar.

# Installation (cont.)

## Connection of "Media Contacts 9" standard auxiliary circuits (figure 16)

The standard auxiliary circuits of the rectifier-inverter and Static Switch Cubicles are connected to the remote relay board by 4 connectors (see the location of this board in the figures of the previous section).

- ▶ recommended cable cross-section: 1 mm<sup>2</sup> (use a shielded cable to connect the battery cell);
- ▶ the male connectors that fit the female connectors on the board (XR1 to XR4) are supplied;
- ▶ the contacts are volt-free and are shown in the diagram under the following conditions: UPS on, contact at rest;
- ▶ contact breaking capacity: 250V, 5A.

### Connection of auxiliary circuits on the remote relay board

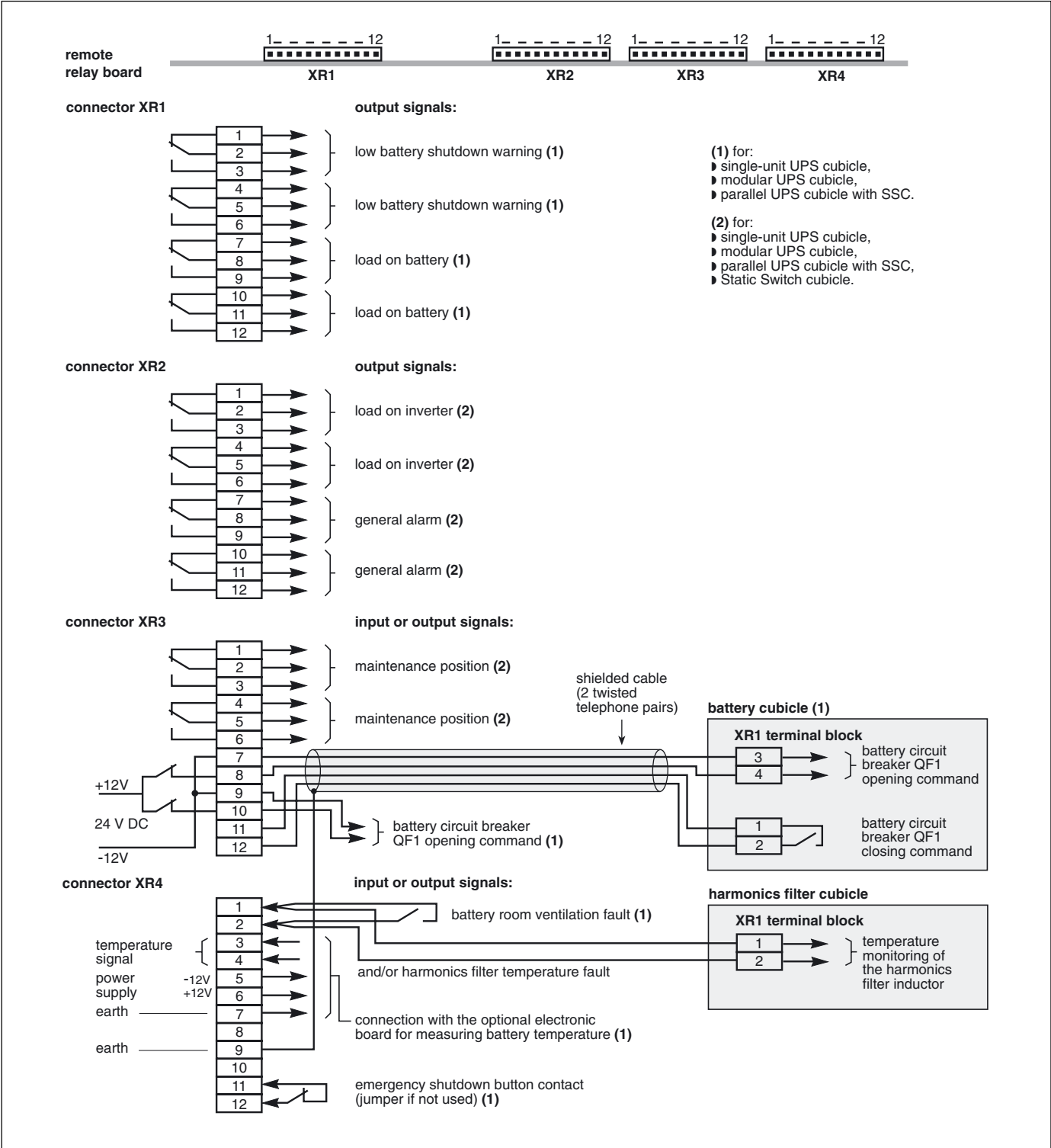


Fig. 16

## Connection to battery circuit breaker QF1

Connect the cable from connector XR3 (pins 7 to 12) of the rectifier-inverter cubicle remote relay board to connector XR1 of the battery cubicle containing battery circuit breaker QF1.

## Emergency shutdown

The UPS emergency shutdown function is generally wired to a "mushroom-head" type emergency off button.

### Important:

In the case of a complex installation with a number of units, there should only be one emergency shutdown pushbutton and this pushbutton must interrupt all the active conductors of all the units.

For the same reason, it is essential for the pushbutton to open the upstream mains 1, mains 2, and external maintenance bypass line protective

circuit breakers.

Each type of unit (UPS and Static Switch Cubicle) must have an independent, volt-free contact connected to the emergency shutdown pushbutton. This pushbutton must therefore have as many contacts as there are units in the installation, as well as the contact or contacts required to open the upstream mains 1 and 2 protective circuit breakers. The emergency shutdown pushbutton turns off the rectifier-chargers and inverters and opens the battery circuit breakers. The emergency shutdown signal will be cleared when the emergency shutdown

pushbutton contact has been reset.

The emergency shutdown pushbutton should not be connected to the Static Switch Cubicle since the pushbutton opens the circuit breaker protecting the upstream circuit (mains 2) and the Static Switch Cubicle is therefore no longer powered (inverters off and mains 2 down).

## Connections between cubicles

(modular UPSs or parallel UPSs with SSC)

On modular UPSs, interconnections are made on the APOZ (figure 17) and MISI (figures 19 to 21) boards in the UPS cubicles (see the layout of the boards in the figures in the previous section).

For parallel UPSs with a centralised SSC, interconnections are made on the APOZ boards in the UPS cubicles (figure 17) and the ACPZ boards (see the layout of the boards in the figures in the previous section) in the SSC (figure 18).

## Connections between APOZ boards

- these connections are made using the ribbon cables supplied;
- the purpose of the connection is to make a loop: connector XM137 of the APOZ board of one UPS being connected to connector XM136 of the APOZ board of the next UPS and so on until the first board is returned to.

### Important:

Outside the cubicles, **group the APOZ inter-board and ACPZ or MISI inter-board connections with the inter-cubicle auxiliary connections, and separate this assembly from the power cables.**

## Connections between rectifier-inverter cubicles

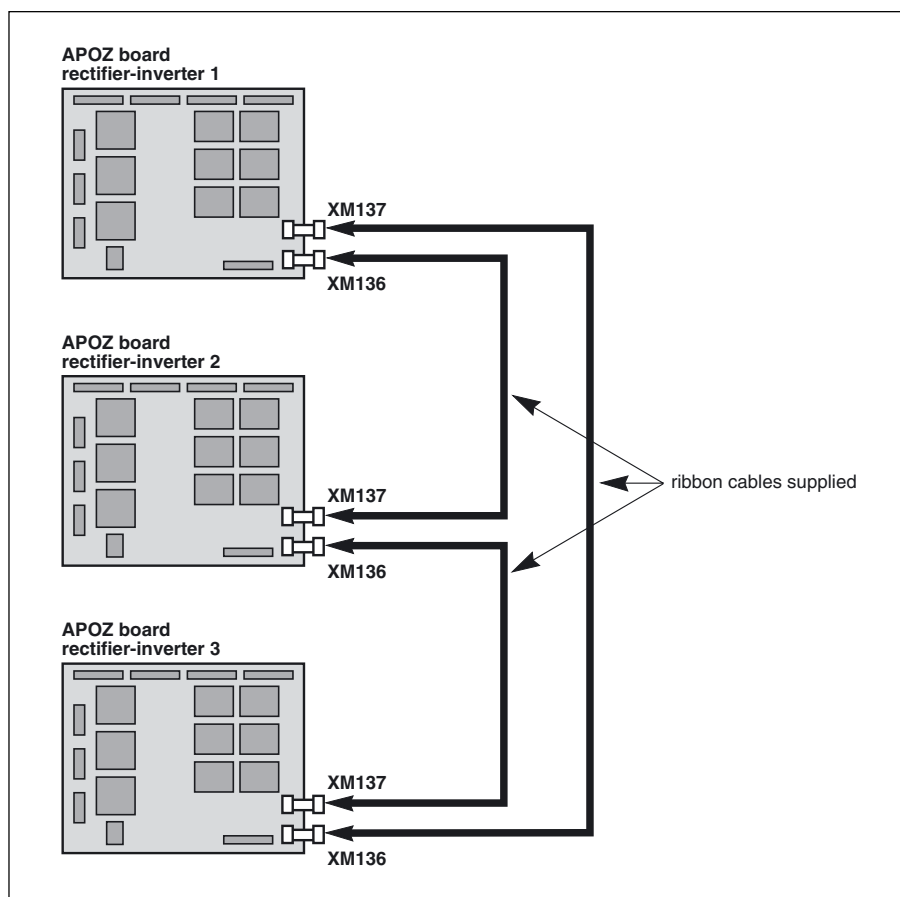


Fig. 17

# Installation (cont.)

## Connections between ACPZ boards (frequency converters or parallel UPSs with SSC)

- these connections are made through the special cables supplied;
- these connections only concern installations with a Static Switch Cubicle and should be made in addition to the connections between rectifier-inverter cubicles described previously;
- the ribbon cable from connector XM133 of the ACPZ board of one rectifier-inverter cubicle is connected to one of the connectors XM127 to XM132 of the ACPZ board of the Static Switch Cubicle.

### Important:

Outside the cubicles, **group the APOZ inter-board and ACPZ inter-board connections with the inter-cubicle auxiliary connections, and separate this assembly from the power cables.**

## Connections between each rectifier-inverter cubicle and the Static Switch Cubicle (example of 3 parallel UPS rectifier-inverters with SSC)

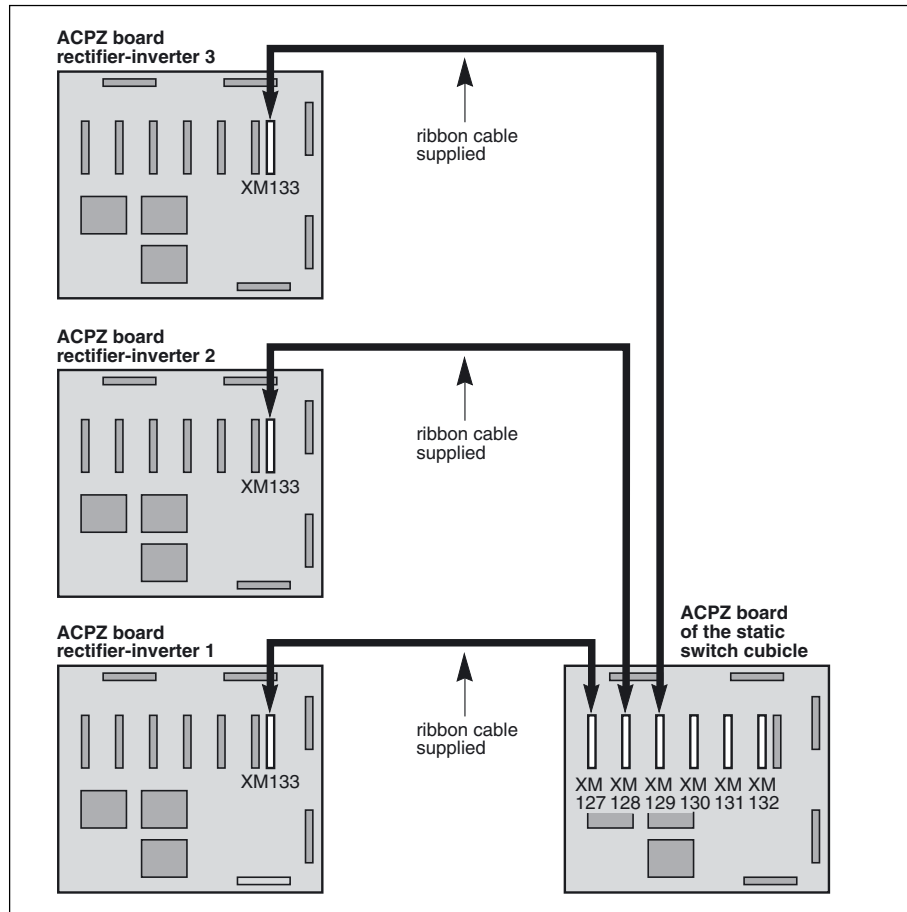


Fig. 18

## Connections between MISI boards (modular UPSs)

See figures 19 to 21.

- these connections are made using the special cables (A) supplied;
- connectors XM5, XM6 and XM7 on the MISI board are used to transmit signals;
- connectors XM10, XM11 and XM12 on the MISI board are used to receive signals;
- connector XM5 is associated with connector XM10 for communication with a second UPS unit; similarly, XM6 is associated with connector XM11 for communication with a third UPS unit and XM7 is associated with connector XM12 for communication with a fourth UPS unit;
- situation with two modular UPS units: see figure 19;
- situation with three modular UPS units: see figure 20;
- situation with four modular UPS units: see figure 21.

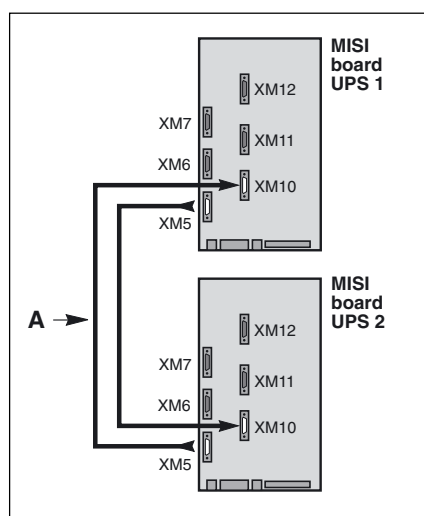


Fig. 19

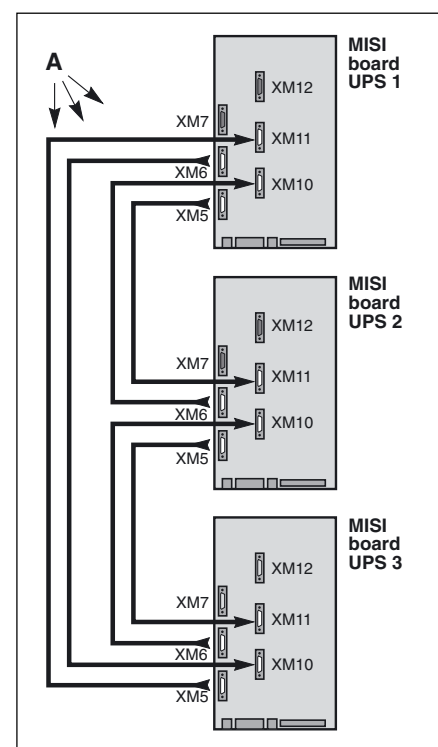


Fig. 20

## Important

Outside the cubicles, **group the cables** between the MISI boards and those between the APOZ boards with the other auxiliary links between cubicles and **separate all these cables from the power cables**.

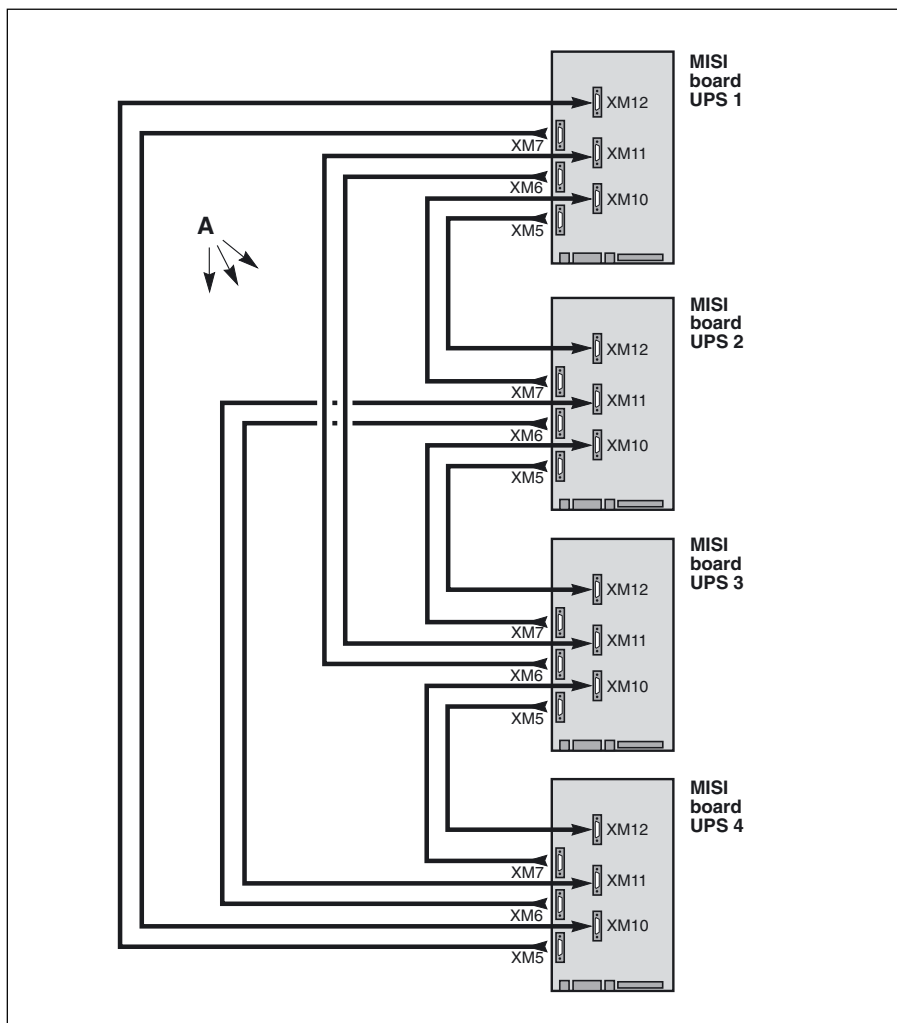
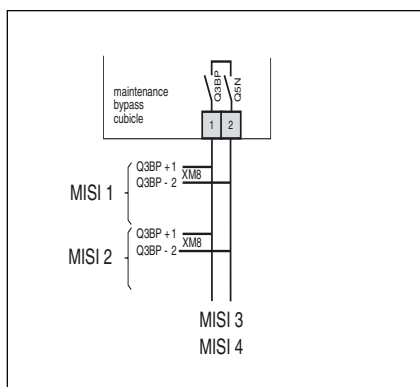


Fig. 21

## Connections between rectifier-inverter cubicles and external maintenance bypass cubicle

- make connections with 1 mm<sup>2</sup> wires (recommended size, not supplied);
- connect terminals 1 and 2 on connector XM8 on the MISI board in the UPS to terminals 1 and 2 in the external maintenance bypass.



Installation (cont.)

Connection of "Media Contacts 15" additional auxiliary circuits (option) (figure 22)

The additional auxiliary circuits of the rectifier-inverter and Static Switch Cubicles are connected to additional remote relay board by means of the 4 connectors (see location of this board in the figures of the "connection of power circuits" section).

- recommended cable cross-section: 1 mm<sup>2</sup>;
- the male connectors that fit the female connectors on the board (XR5 to XR9) are supplied;
- the contacts are volt-free and are shown in the diagram under the following conditions: UPS on, contact at rest;

- contact breaking capacity: 250V, 5A.
- Note:**  
In a parallel-connected UPS installation the "load" and "mains 2" signals are provided by the Static Switch Cubicle.

ACPZ board of the Static Switch Cubicle

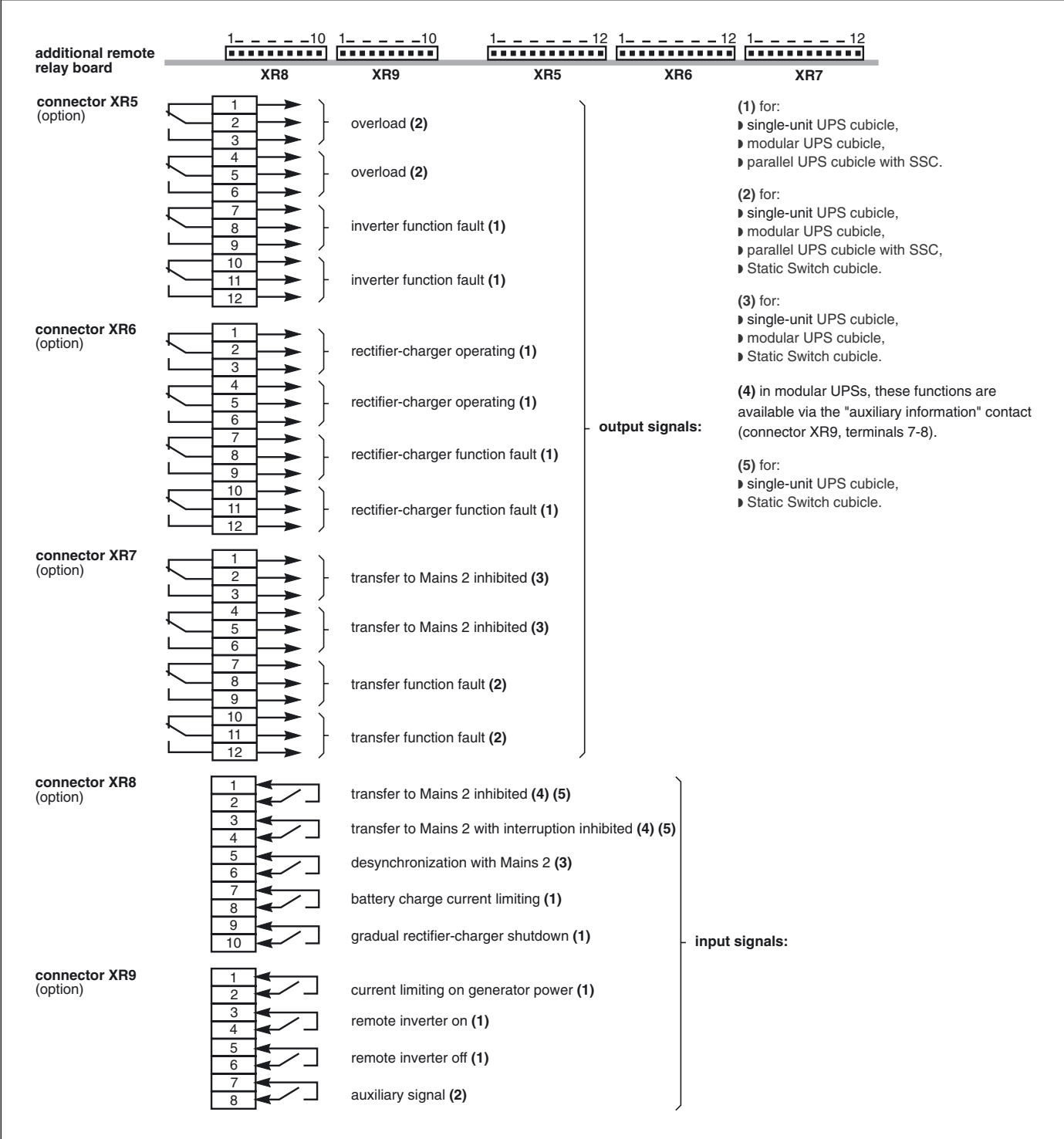


Fig. 22

## Connection of the battery "Temperature Monitor" (optional)

### Connections

This unit must be connected to connector XR4 of the remote relay board of the rectifier-inverter cubicles (see the location of the remote relay board in the figures of the "power circuit connection" section).

- ▶ use a shielded cable made up of 2 twisted telephone pairs with a conductor cross-section of at least 0.1 mm<sup>2</sup> and up to 100 m in length;
- ▶ do not forget to connect the cable shield to ground pin 7 of connector XR4;
- ▶ in the case of a parallel UPS configuration, the connections between cubicles may be made by means of a shielded cable made up of 1 or 2 twisted telephone pairs. In this case, the total length of all the connecting cables should not exceed 100 m;
- ▶ a "Temperature Monitor" can only be connected to several rectifier-inverter cubicles when the batteries of these cubicles are located in the same room at the same ambient temperature.

### Connection of the battery "Temperature Monitor" (for a single-unit UPS)

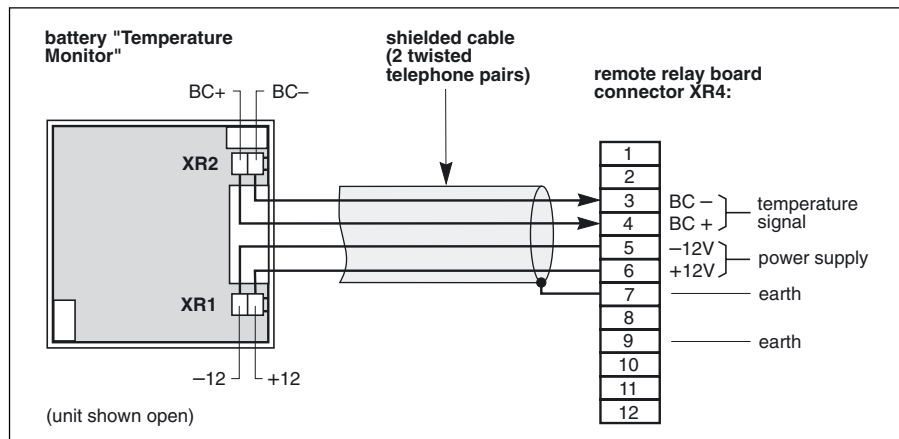


Fig. 23

### Connection of the battery "Temperature Monitor" (for a parallel UPS with batteries in the same room)

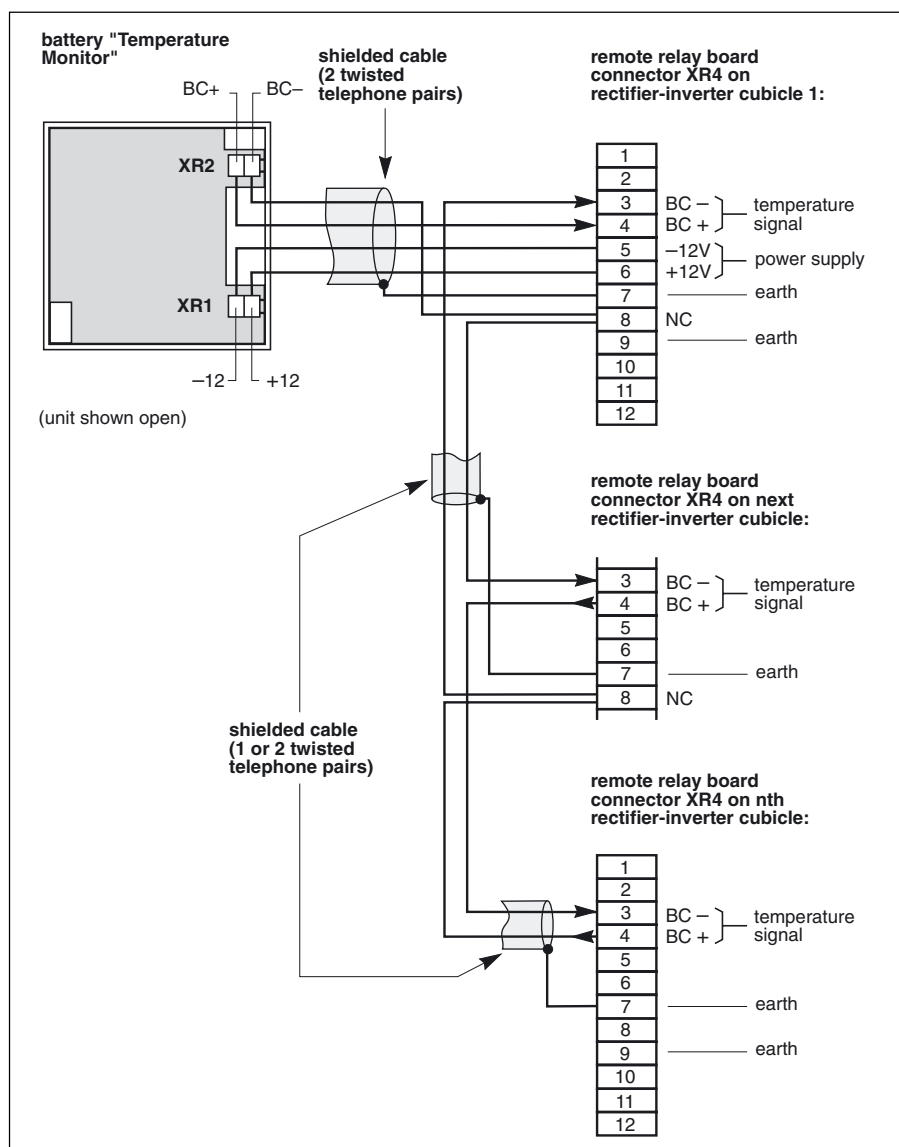


Fig. 24

# Installation (cont.)

## "Temperature Monitor" installation in a APC by Schneider Electric battery cubicle

The "Temperature Monitor" is fitted on mounting brackets inside the left-hand door of the battery cubicle containing circuit breaker QF1 (see figure 25).

The unit is self-adhesive and is secured simply by pressing it against the door:

- before mounting the unit, break the knock-out in its base plate provided for feeding through the connecting cable;
- clean the mounting location on the door using isopropyl alcohol or heptane to obtain a clean, dry adhesion surface (comply with supplier safety recommendations for handling solvents);
- it is essential, for correct temperature sensor operation, for the unit to be positioned as shown in figure 25 ("on" light in the top left hand corner and cable fed through from the right-hand side);
- firm pressure is required to ensure that the unit is bonded over the full adhesive surface;
- the door should be at a temperature of at least 10°C;
- after installation, fold up the mounting bracket tabs to fully secure the unit;
- tie the connecting cable to the cubicle upright so that it does not pull on the unit.

## Installing the "Temperature Monitor" in a battery cubicle

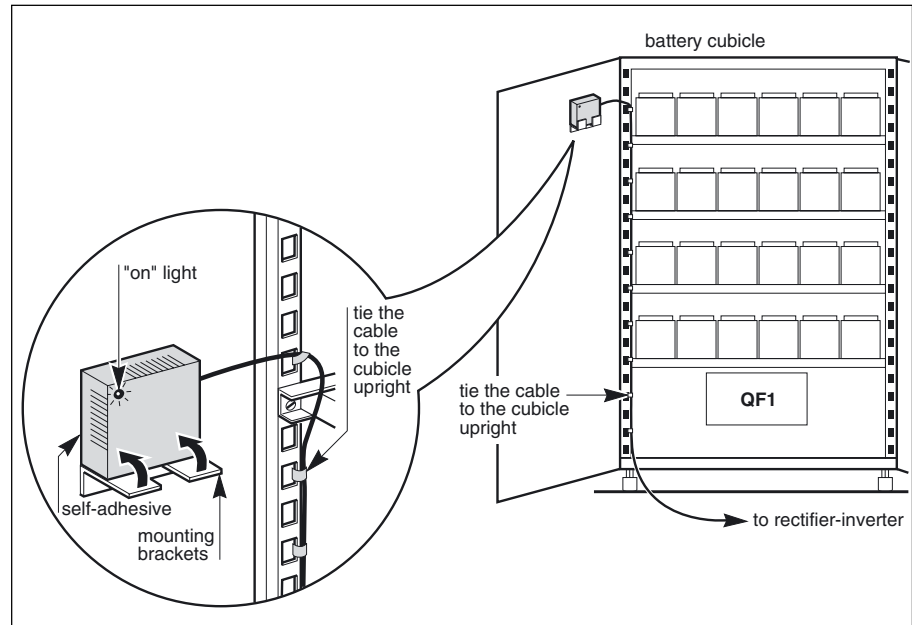


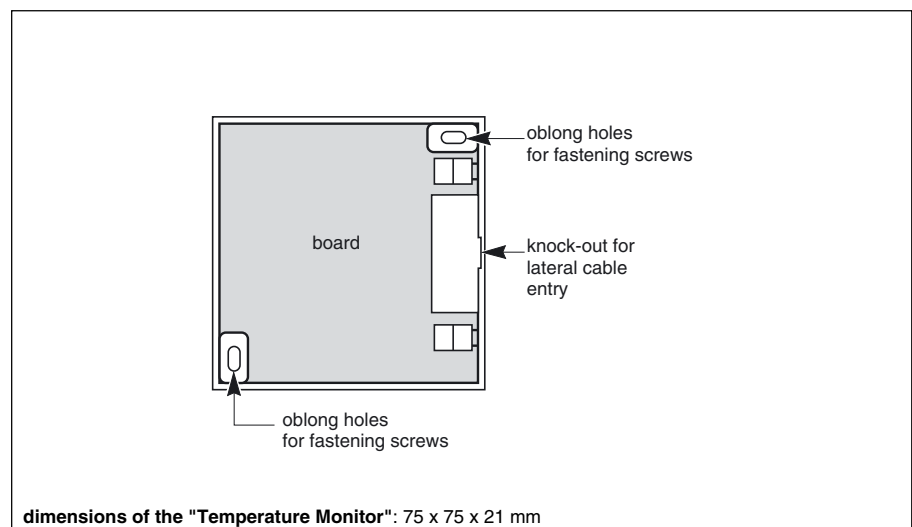
Fig. 25

## "Temperature Monitor" installation in a battery room

The "Temperature Monitor" should be secured against a wall or any vertical support:

- choose a location near the batteries and away from draughts which adversely affect the accuracy of temperature measurements;
- position the unit correctly ("on" light in the top left hand corner and cable fed through from the right-hand side);
- use the holes provided in the base plate to screw the unit to the vertical support (see figure 26);
- unless the connecting cable runs on the surface, break the knock-out in the unit base plate provided for cable entry;
- secure the cable by suitable means so that it does not pull on the unit.

## "Temperature Monitor" base



dimensions of the "Temperature Monitor": 75 x 75 x 21 mm

Fig. 26



## Connection of the "LED" remote indications unit

This unit is connected to connectors XR1 and XR2 of the remote relay boards of the rectifier-inverter and Static Switch Cubicles (see the location of these boards in the figures of the "connection of power circuits" section).

For the installation of the unit and details of connections at the unit end, see the instructions delivered with the unit nr 5102990400.

- ▶ recommended cable cross-section: 1 mm<sup>2</sup>.

## Connection of "Tele Monitor" remote control and indication unit (option)

This unit is connected by means of a signal loop connecting the XR10 connectors of the RAUZ 1 boards of the rectifier-inverter and Static Switch Cubicles to the unit connectors. These RAUZ 1 boards are located near the remote relay boards.

- ▶ recommended cable cross-section: shielded 0.4 mm<sup>2</sup> cables;
- ▶ consult manual 6739388XU for further information.

### Connection of "Tele Monitor" remote control and indication unit

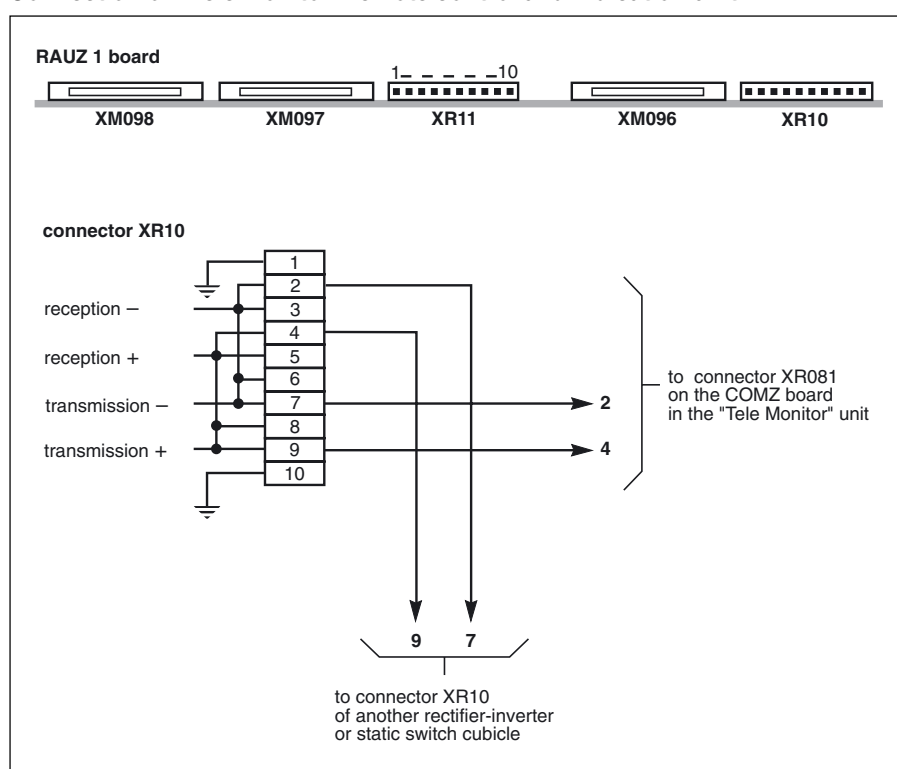


Fig. 27

## Link to an IBM AS/400® computer

The MGE™ Galaxy™ 6000 UPS can dialogue with an IBM AS/400® computer via this link in compliance with IBM communication recommendations, thus enhancing the protection provided by your MGE™ Galaxy™ 6000 UPS.

The IBM AS/400® computer must be configured for the link. This document presents the physical connections required as well as the system values that must be modified on the AS/400®. For further information, consult the following IBM documents:

- ▶ "Planning Guide, Appendix E" concerning physical connections;
- ▶ "Back-up and Recovery Guide", chapter 7 "Power Loss Recovery" concerning configuration of the AS/400®.

### Connections:

- ▶ connections are made to the female client connectors XR1 and XR2 on the "Media Contacts 9" relay board;
- ▶ the corresponding male connectors are supplied;
- ▶ see figure 28 for the wiring diagram. A five-wire cable (not supplied) is required;
- ▶ on the AS/400® side, use a 9 or 15-pin SUB-D connector, depending on the type of AS/400®.

# Installation (cont.)

**Configuration of the AS/400®**  
Certain values on the AS/400® must be configured to enable operation of the MGE™ Galaxy™ 6000 AS/400® link.

The values requiring modification and the corresponding procedures are presented in chapter 7 "Power Loss Recovery" of the "Back-up and Recovery Guide" for the AS/400®.

- The values are the following:
- QUPSMMSGQ    UPS message Queue;
  - QUPSDLYTIM    Uninterruptible Power Supply Delay Time;
  - QPWRRSTIPL    Power Restore IPL.

## Connection to the "Media Contacts 9" relay board

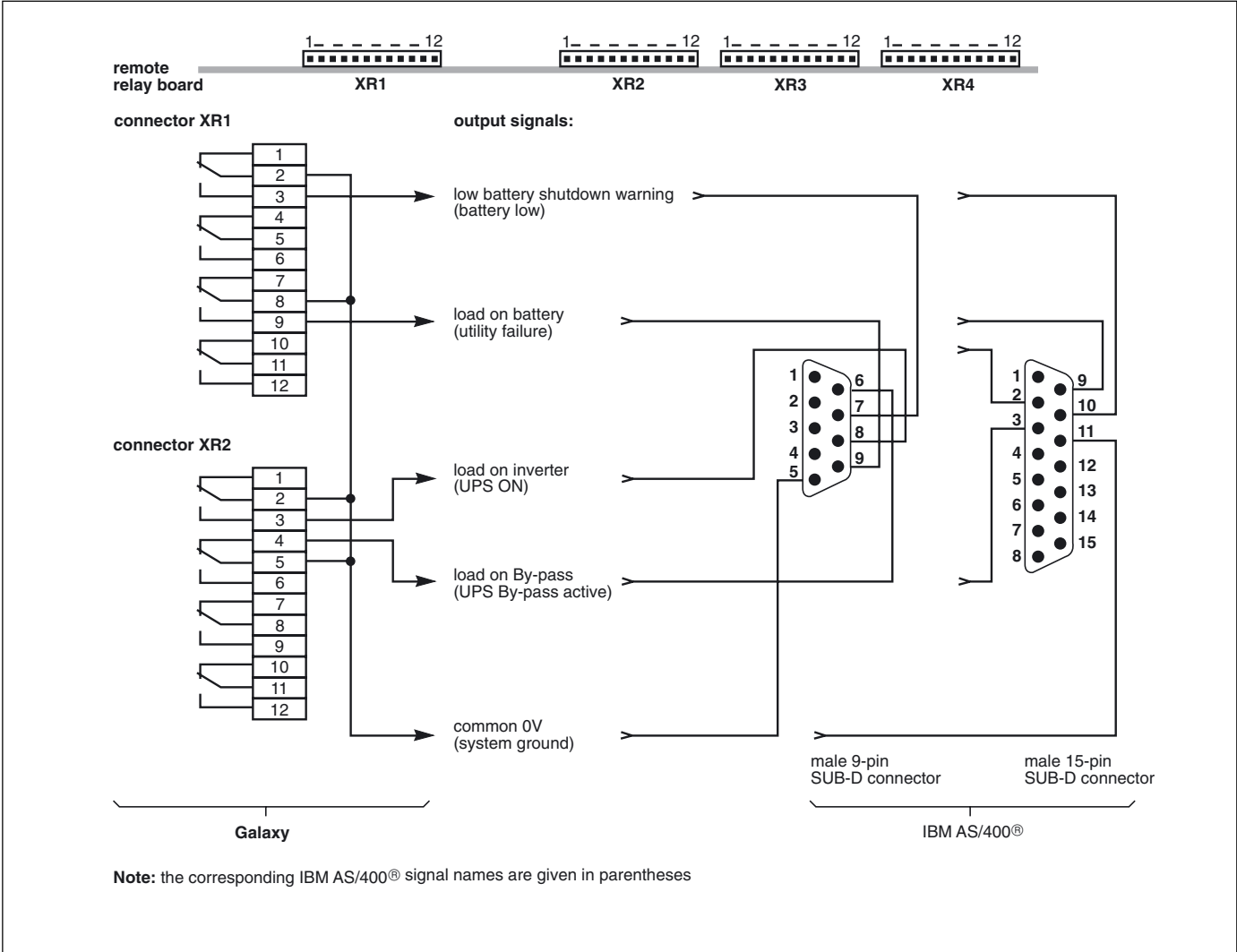


Fig. 28

## Final installation steps

- After making the connections:
- install the front and rear base plates of the cubicles, clipping them to the feet of the cubicles (unless the connecting cables are fed through these openings);
  - refit the terminal shields of the terminal blocks, switches and circuit breakers.

# Appendix (to be carried out by qualified personnel only)

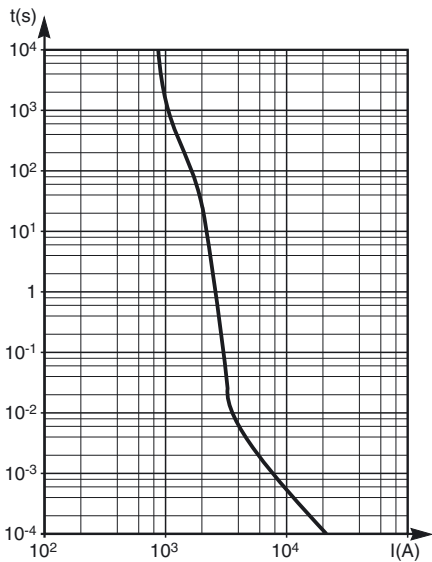
## Mains 2 line protection

The rating of the mains 2 line upstream protection circuit-breaker must be chosen:

- to protect the static switch thyristors with respect to maximum permissible currents. Refer to the table opposite for a 400V mains 2 voltage;
- to ensure discrimination with respect to the UPS output fuses (refer to fuse time-current curves below) and to the downstream protective devices.

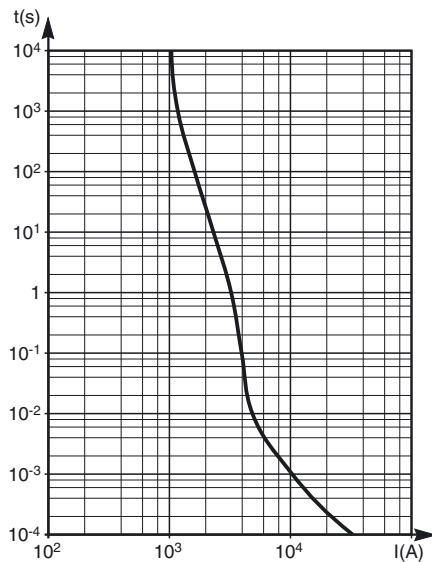
rated inverter output (kVA)	maximum permissible current
250 to 300	10 In for 20 ms
400 to 450	13 In for 20 ms
500 to 600	27 In for 20 ms

UPS 250 to 450kVA



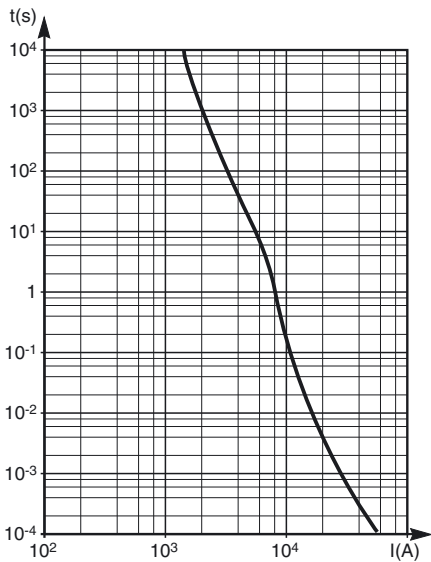
Time-current curve 630A fuse

UPS 500kVA



Time-current curve 800A fuse

UPS 600kVA



Time-current curve 1250A fuse

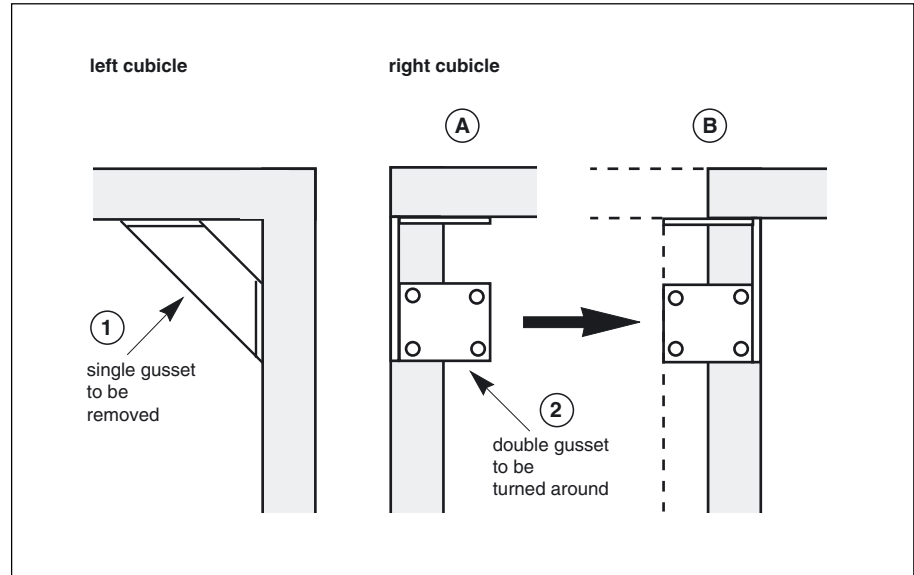
## Appendix (cont.)

### Cubicle mounting and connection for 600kVA UPSs

#### Cubicle mounting

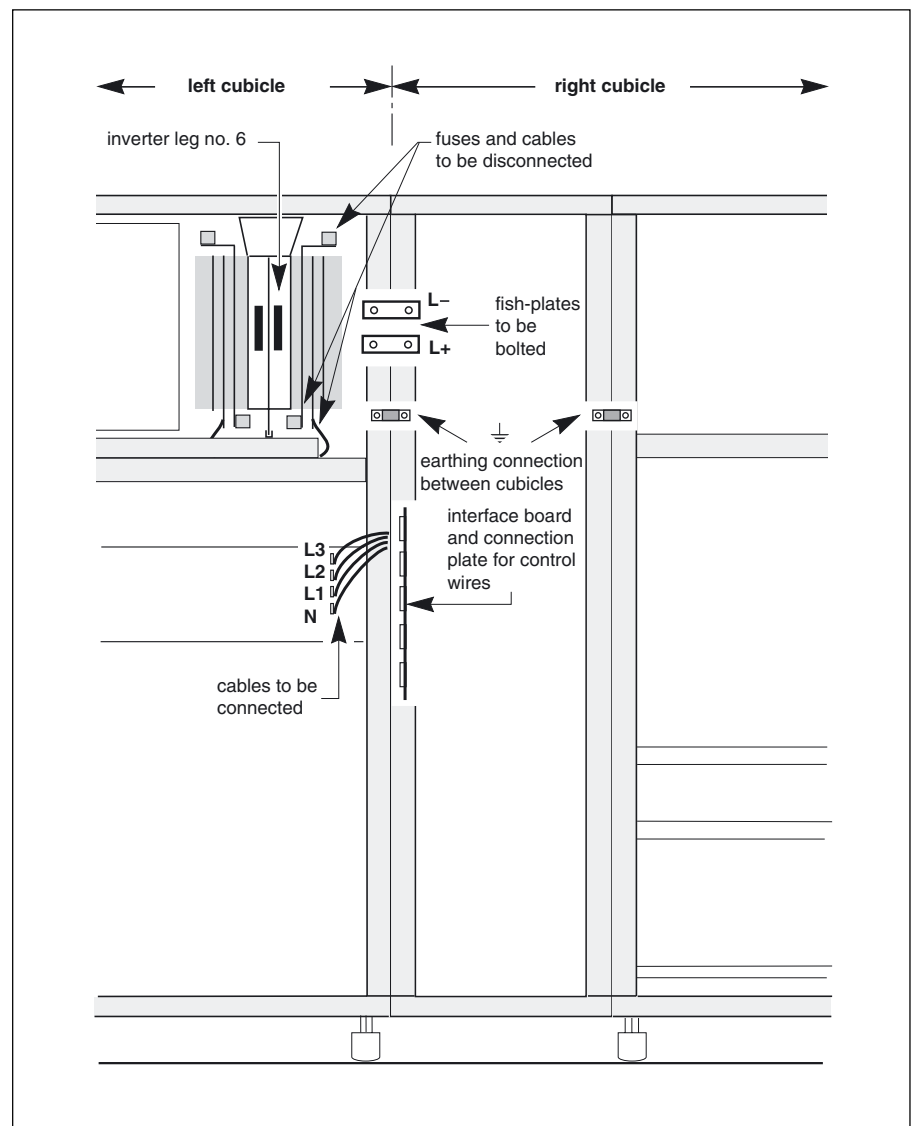
Gusset plates have been fitted to the top corners on all four sides of the cubicles to provide reinforcement for transportation.

- ▶ prior to joining the two cubicles, remove the two gussets from the right side of the left cubicle;
- ▶ move the cubicles to their operating location;
- ▶ adjust the front foot pads so that the cubicles are vertical and their doors aligned;
- ▶ remove the top panel on the left side of the right cubicle for access to the side gussets (see figure opposite);
- ▶ remove the gussets ① on the front of the left cubicle;
- ▶ remove and turn around the double gussets ② on the right cubicle and use them to bolt the two cubicles together.



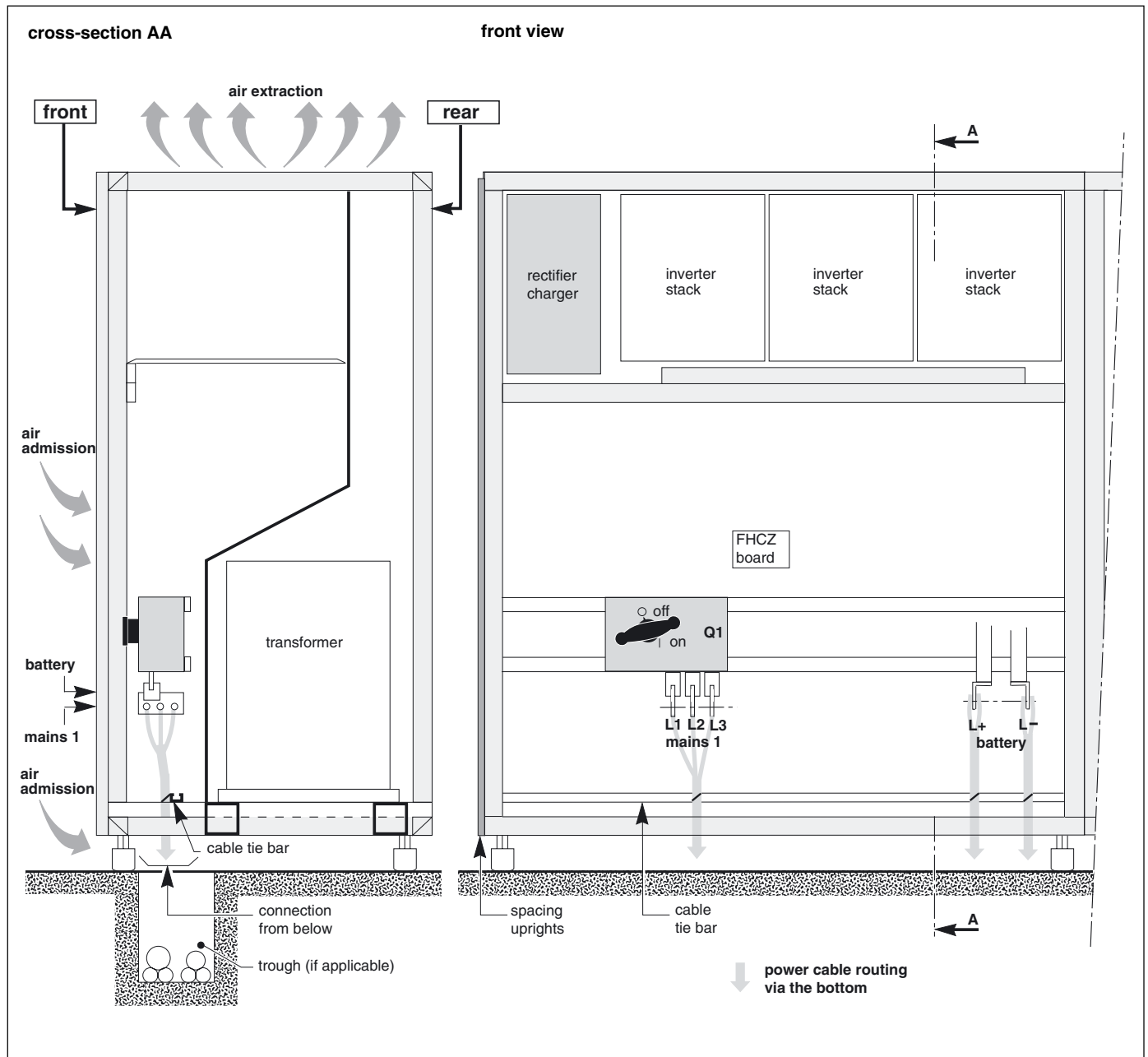
#### Internal connections between cubicles

- ▶ removal of inverter leg no.6 is recommended prior to bolting fish-plates L+ and L-:
- ▷ first remove the two fuses and the two cables connected to the leg,
- ▷ then pull the leg out;
- ▶ bolt fish-plates L+ and L-;
- ▶ refit inverter leg no 6;
- ▶ intended only for transportation, the front gussets do not need to be refitted;
- ▶ bolt cables L1, L2, L3 and N (4 x 2) coming from the right cubicle to the terminals marked L1, L2, L3 and N respectively, in the left cubicle;
- ▶ connect the earth strap to the front uprights of both cubicles;
- ▶ connect the connectors marked XF281 to XF285 on the five ribbon cables coming from the left cubicle to connectors XM281 to XM285 respectively on the interface board located on the left side of the right cubicle;
- ▶ connect the connectors marked XF01 to XF06 (XF01 to XF07 for parallel UPSs) on the control wires coming from the left cubicle to connectors XM01 to XM06 (XM01 to XM07 for parallel UPSs) on the plate on the left side of the right cubicle.



## Connection of power and auxiliary circuits

### Left cubicle of 600kVA single-unit or parallel UPS with SSC



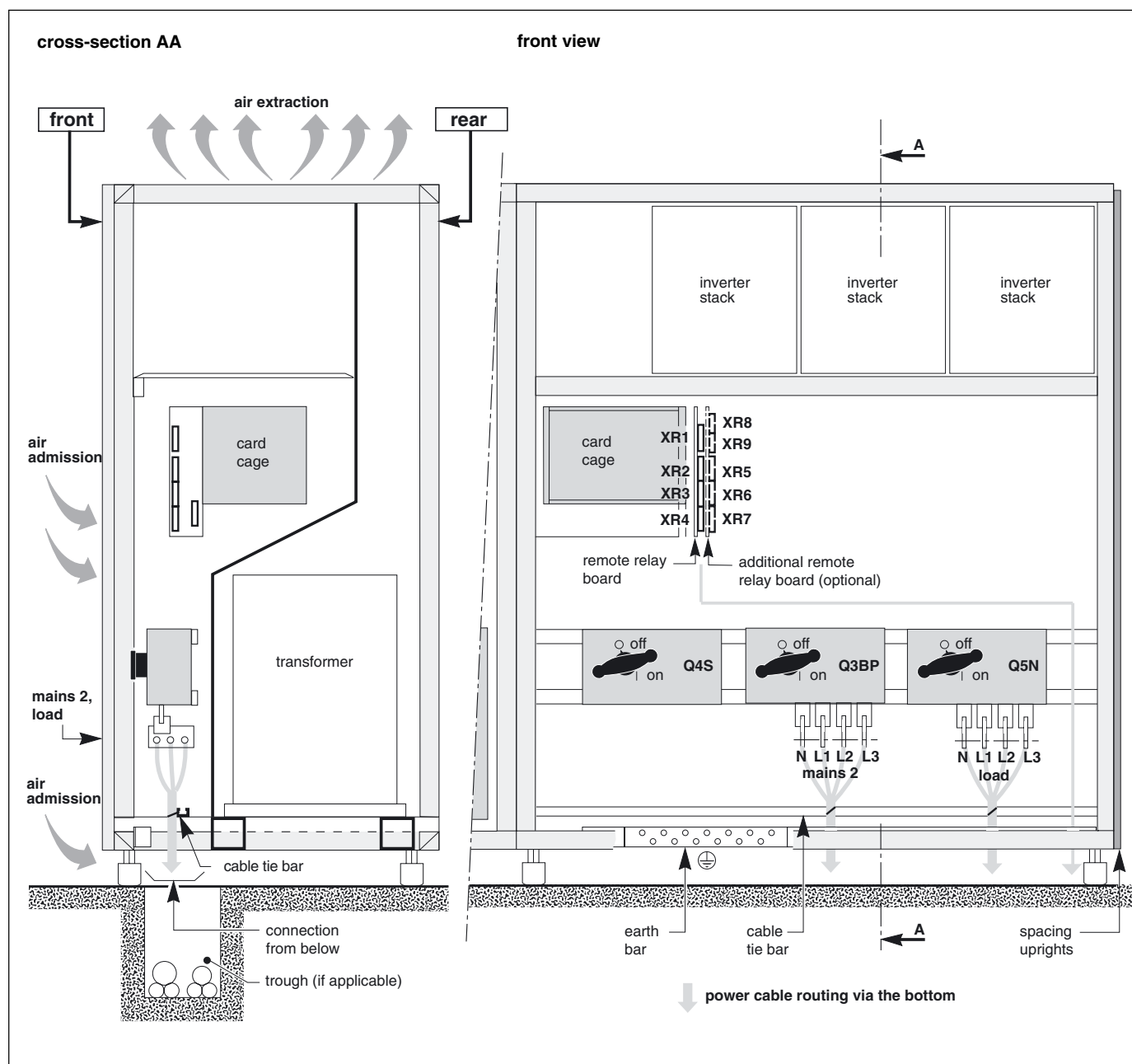
Cables connected by lugs to 100 x 8 mm copper terminals and 13 mm diameter holes.

Height of connections relative to floor:

- ▶ mains 1: 450 mm;
- ▶ battery: 480 mm.

## Appendix (cont.)

### Right cubicle of a 600kVA single-unit UPS

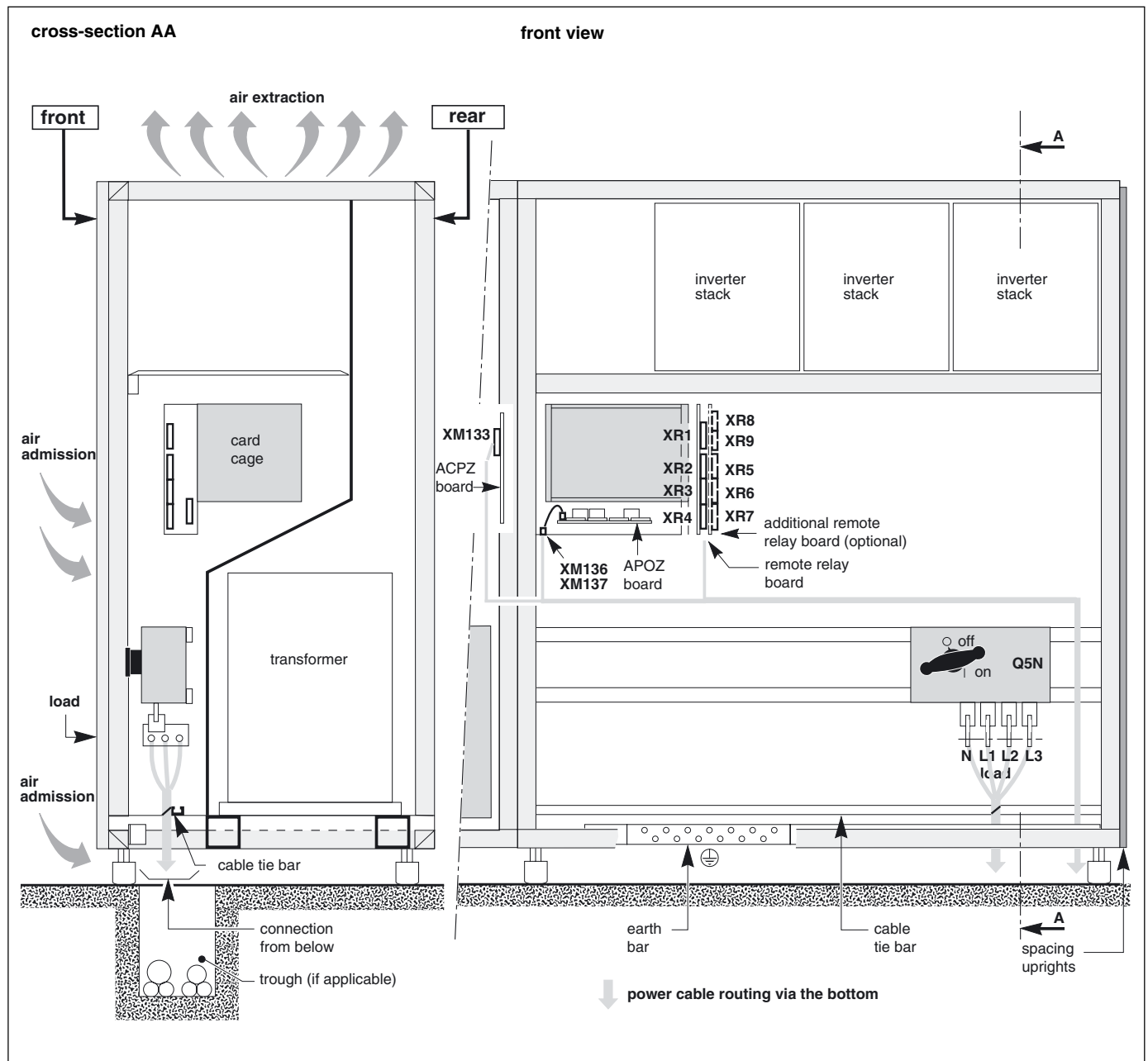


Cables connected by lugs to 100 x 8 mm copper terminals and 13 mm diameter holes.

Height of connections relative to floor:

- mains 2 and load: 430 mm;
- remote relay board: 1030 mm.

## Right cubicle of a 600kVA parallel UPS with SSC



Cables connected by lugs to 100 x 8 mm copper terminals and 13 mm diameter holes.

Height of connections relative to floor:

- mains 2 and load: 430 mm;
- remote relay board: 1030 mm.

## Appendix (cont.)

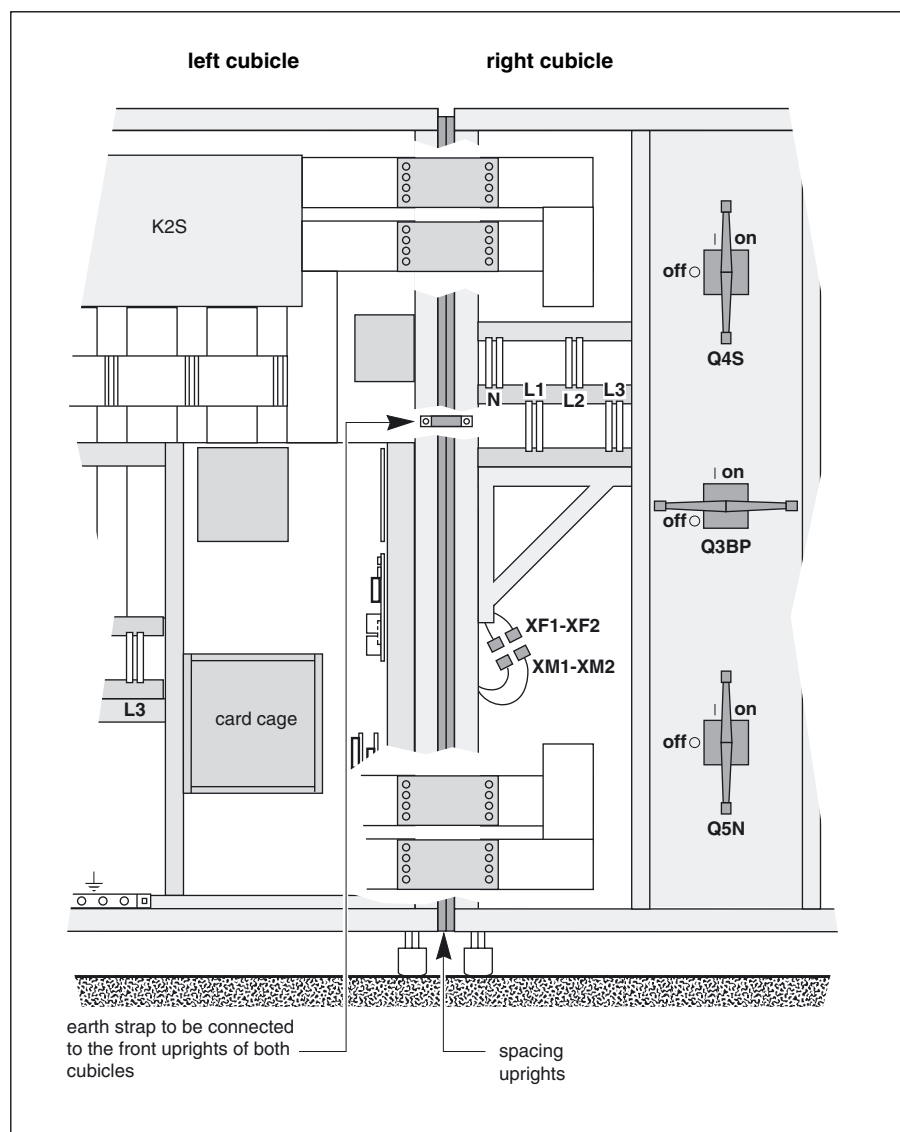
### Cubicle mounting and connection for 2000kVA Static Switch Cubicle

#### Cubicle mounting

- move the cubicles to their operating location;
- adjust the front foot pads so that the cubicles are vertical and their doors aligned.

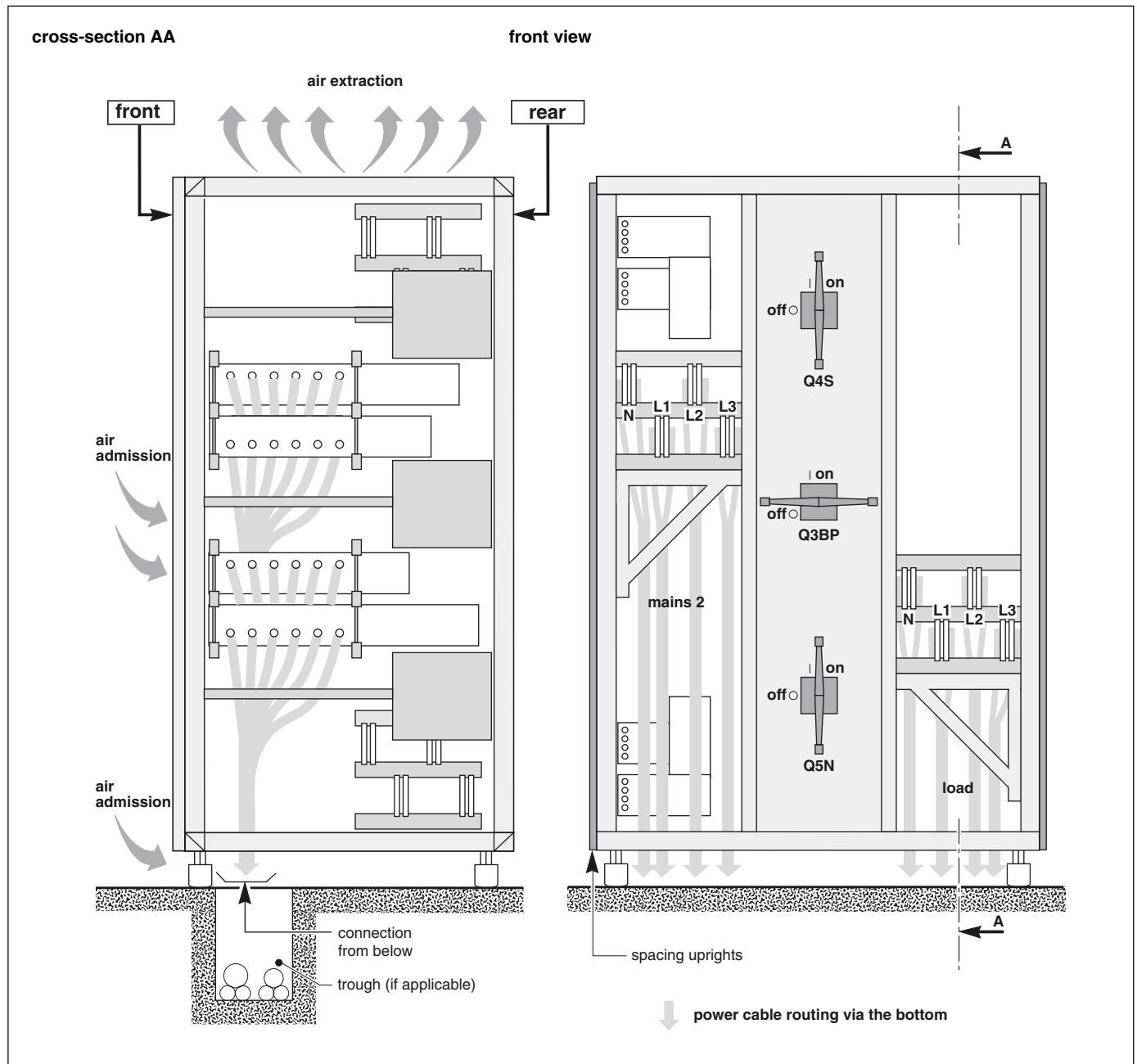
#### Internal connections between cubicles

- install and bolt the supplied fish-plates on the bars for the phases and neutral (L1, L2, L3, N) between the two cubicles (four bars in top and four bars in bottom);
- connect the earth strap to the front uprights of both cubicles;
- connect the connectors marked XM1 and XM2 from the left cubicle to the connectors marked XF1 and XF2 in the right cubicle.





## Right cubicle of a 2000kVA Static Switch



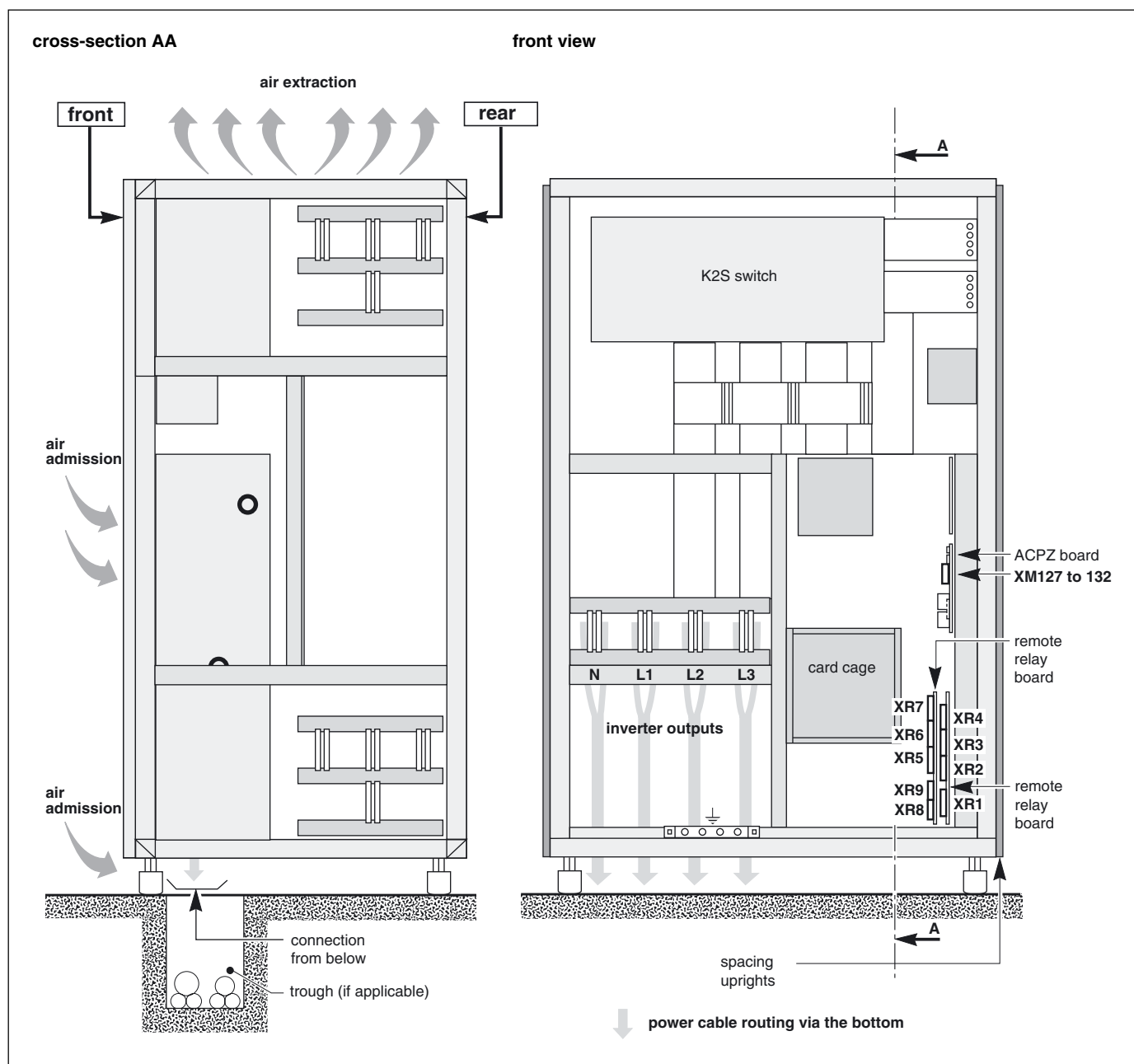
Cables connected by lugs to  
5 x (5 x 100) mm copper terminals and  
16 mm diameter holes.

Height of connections relative to floor:

- ▶ mains 2 : 1400 mm;
- ▶ load: 800 mm.

## Appendix (cont.)

### Left cubicle of a 2000kVA Static Switch



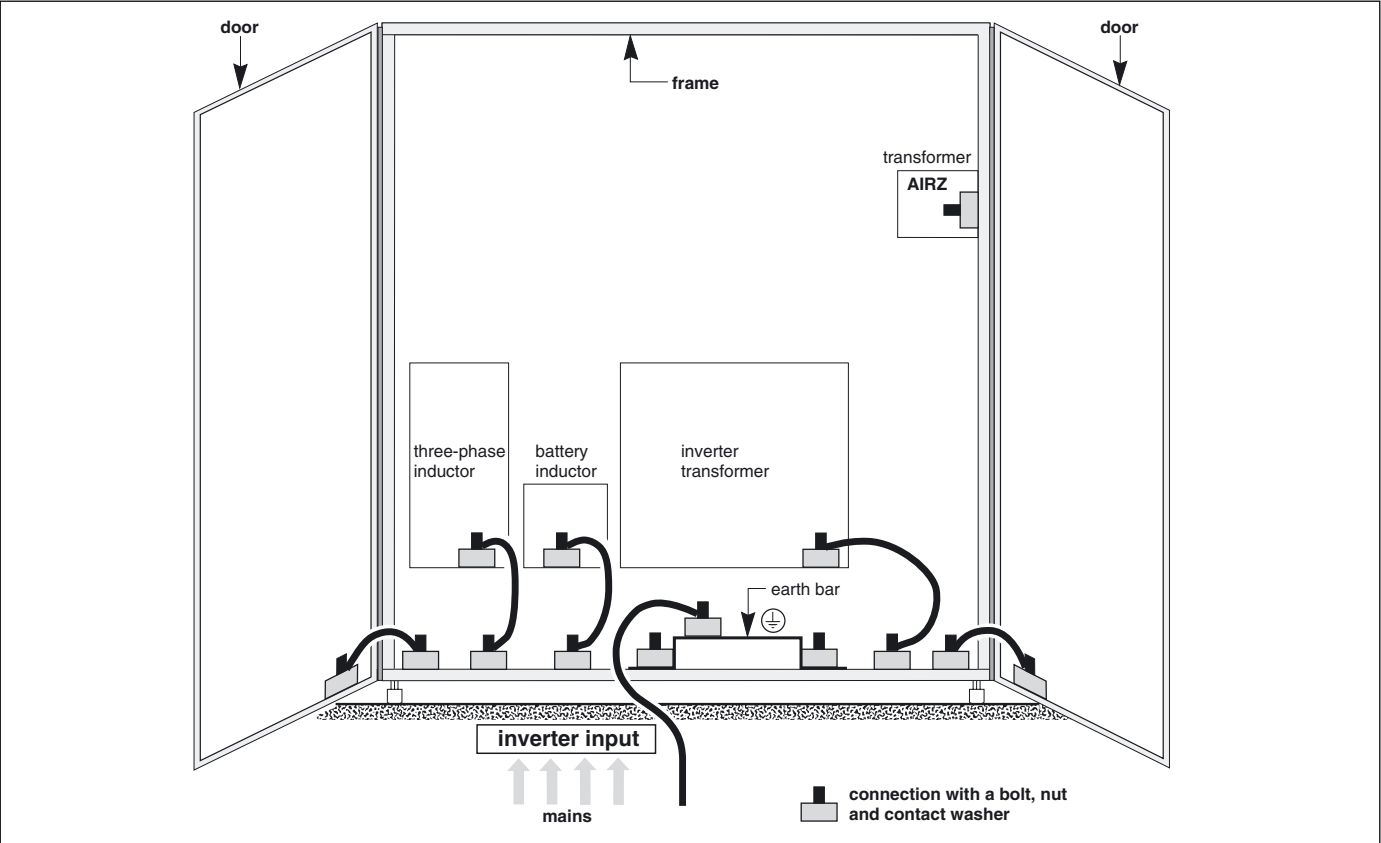
Cables connected by lugs to  
5 x (5 x 100) mm copper terminals and  
16 mm diameter holes.

Height of connections relative to floor:

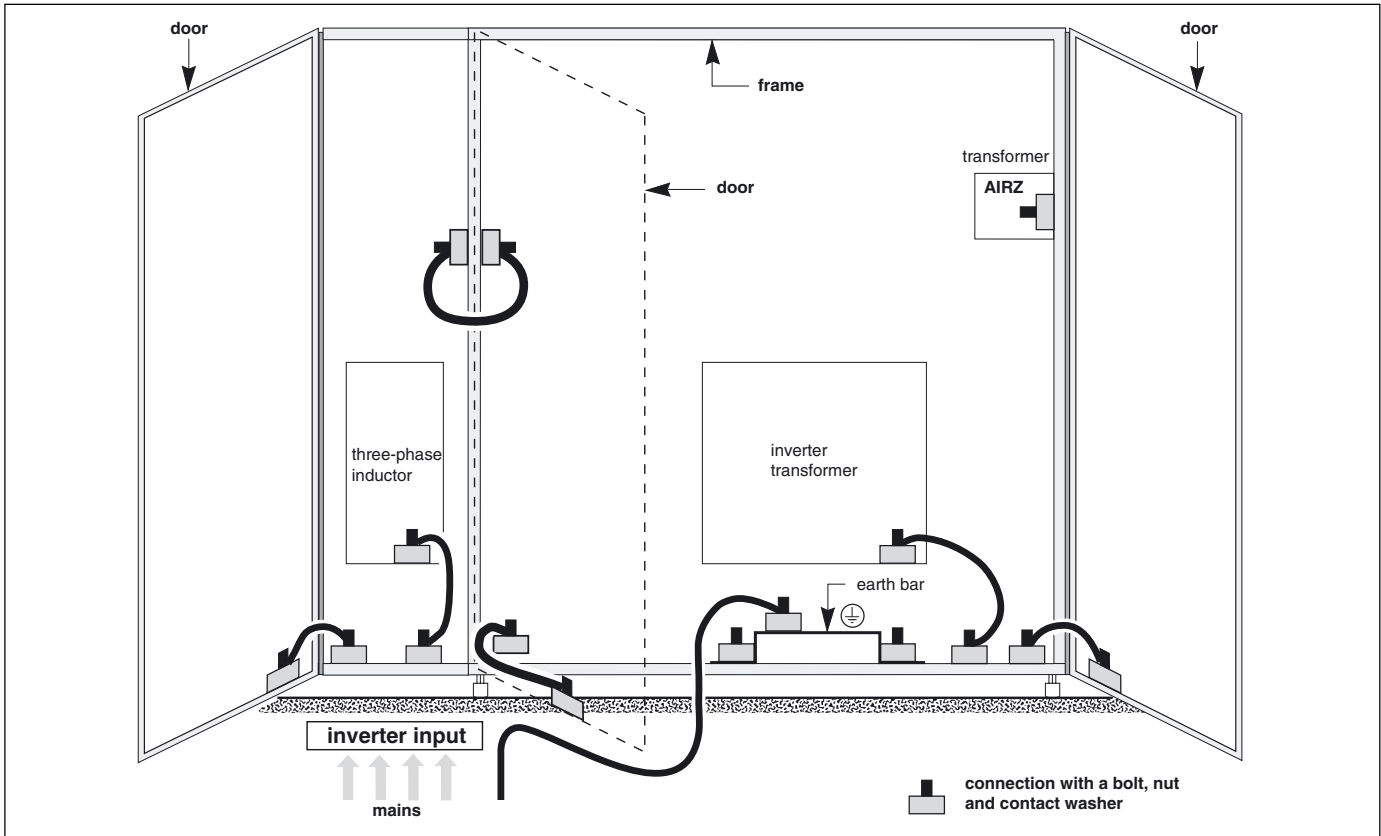
- inverter outputs : 700 mm
- remote relay board: 500 mm.

Details of earthing connections in the various cubicles

250 to 400kVA rectifier-inverter cubicle

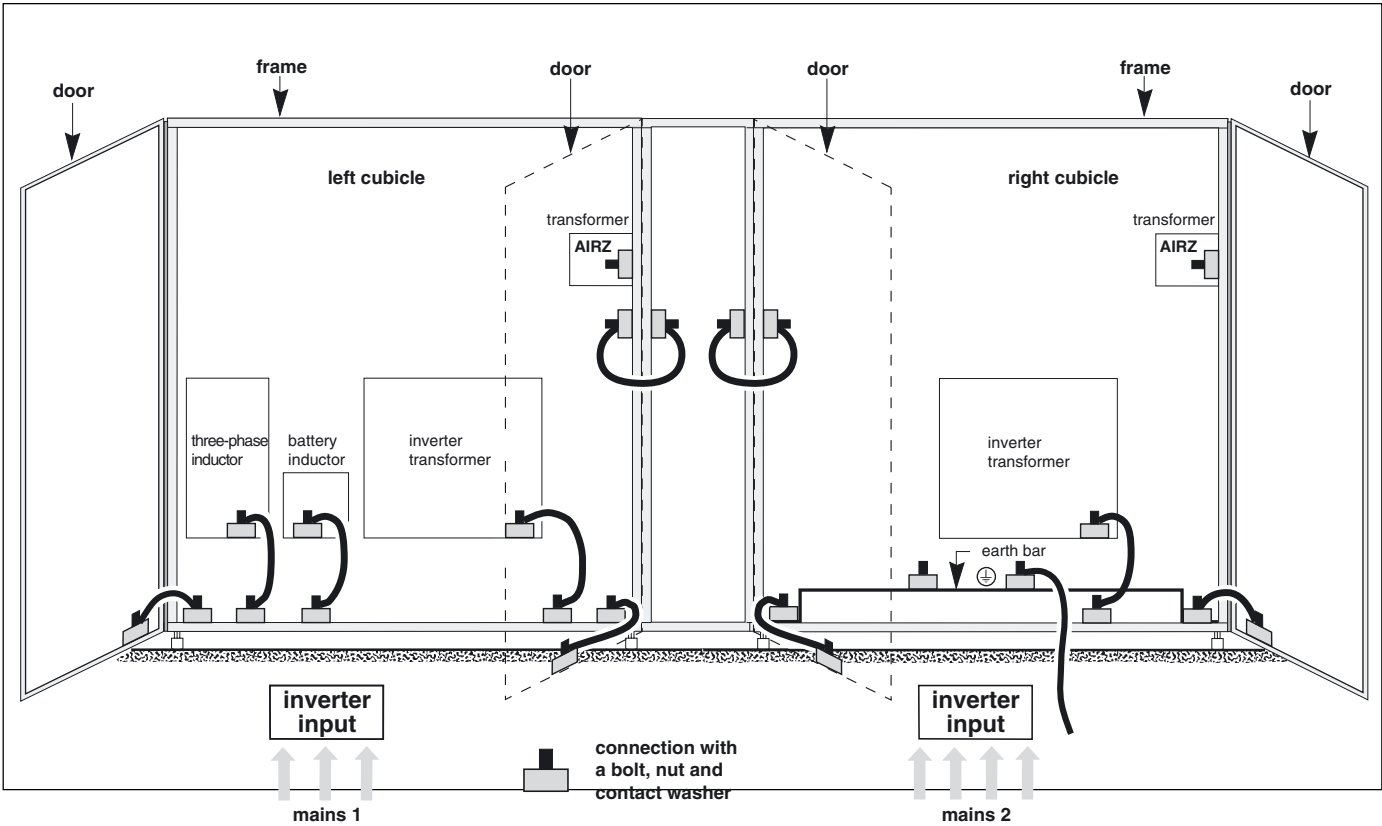


450 - 500kVA rectifier-inverter cubicle

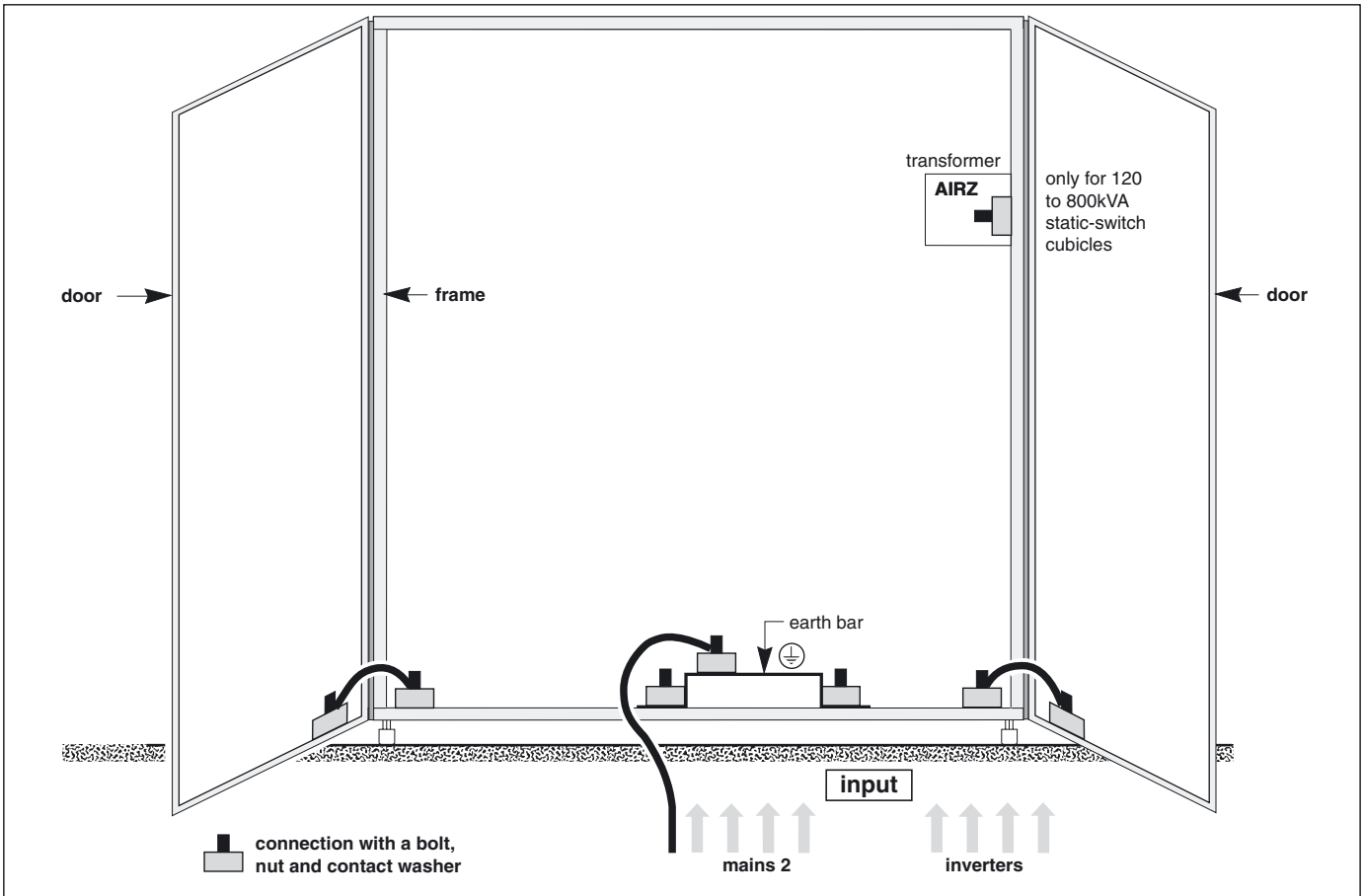


Appendix (cont.)

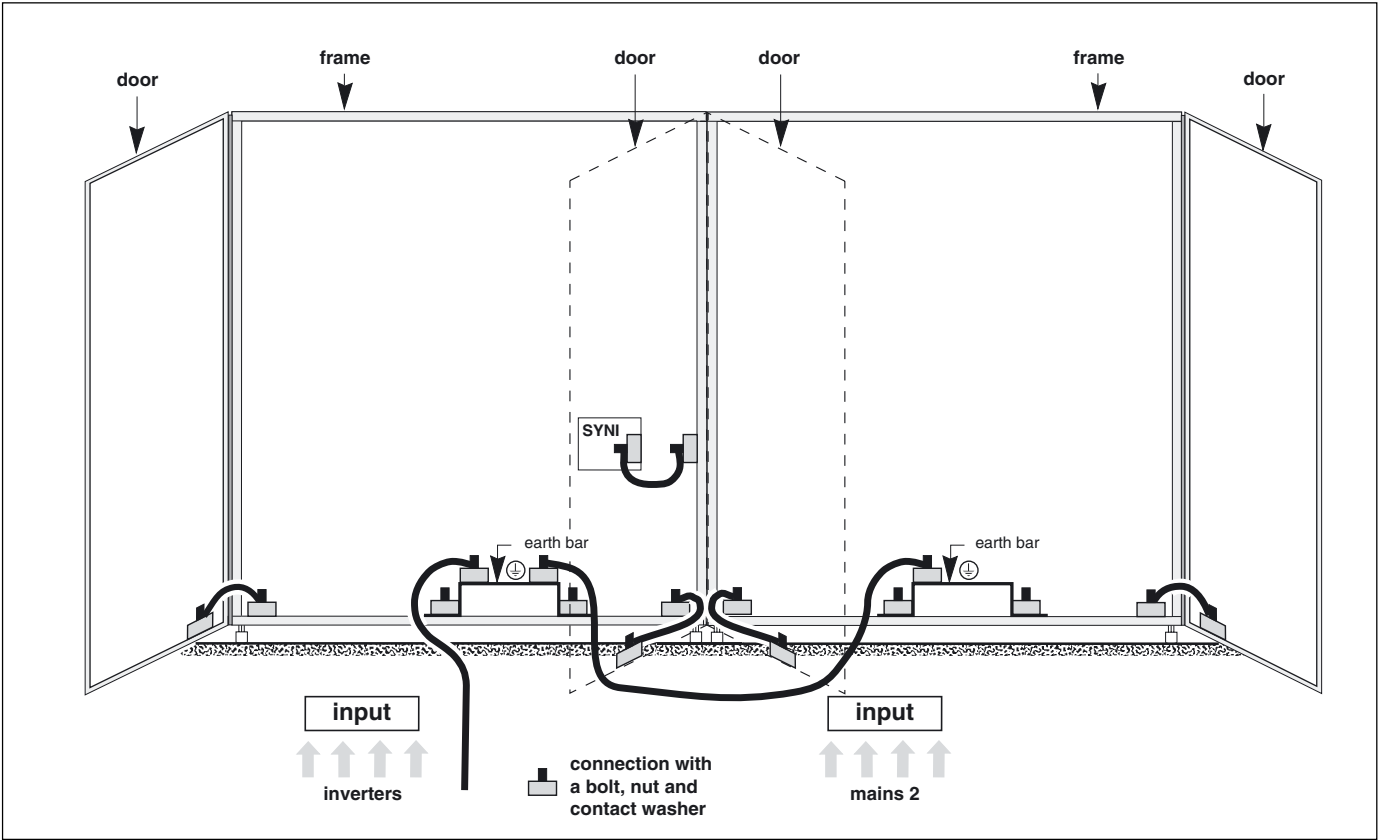
600kVA rectifier-inverter cubicle



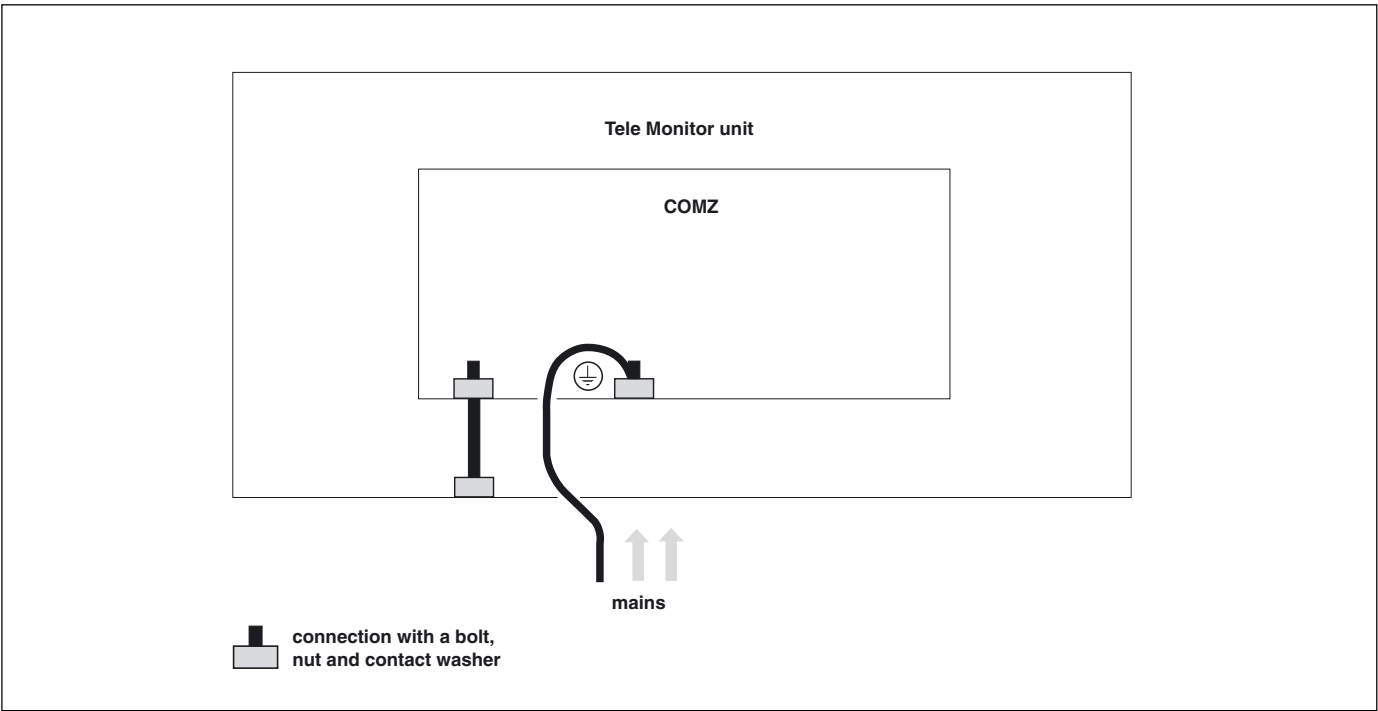
120 to 1200kVA Static Switch Cubicles



2000kVA Static Switch Cubicles



"Tele-Monitor" unit





by **Schneider** Electric